MANAGING CLIENT VALUE AT THE STRATEGIC BRIEFING STAGE OF CONSTRUCTION PROJECTS

by

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Submitted for the degree of Doctor of Philosophy

Heriot-Watt University

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September 2005

ABSTRACT

Construction project briefing is the activity of taking from a client a clear, unambiguous and explicit performance specification of a project. The project is a separate, temporary activity for the client often unrelated in character to that of the client's core business. There is a presumption that the values which are of importance to the client will align with those of the project.

A study of current briefing and value management literature highlights the absence of a method for the explicit representation of the client value system as it relates to the construction project although the concept of client value is acknowledged. This leads to the research proposition that it is practical to develop a framework for the explicit exposition of the client value system for use in a value management workshop at the strategic briefing of construction projects. The value system should contain all discretionary variables for the definition of client values at this stage.

This thesis describes research into axiology in the context of construction project briefing leading to a method for the explicit representation of the client value system. The method was tested through action research studies. The evidence in this thesis supports the conclusion that the variables of the construction client value system are the nine high order variables of capital cost, operating cost, time, esteem, exchange, environment, politics/community, flexibility and comfort. There are no other discretionary performance variables which are not correlated with these. The client value system at the strategic briefing stage of a construction project can be realised through a matrix model. The model is designed to work within the context of a value management workshop.

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Chapter 1 Introduction

1.01 Background

The catalyst for this study of the construction client's value system at the strategic briefing stage of construction projects is the challenge to solve the apparent anomaly that whilst both value management practices and briefing practices purport to manage client values neither practices have overt systems for so doing.

Previous research has described the concept of client value but none has attempted to discover its component parts in such a way that a client value system can be summarised in explicit terms. The aim of this research is to discover and describe the discrete entities which make up the construction client's value system and to link them to a model which is suitable for use within a value management workshop environment.

This aim has the linked objectives of:

- A review of the value management literature to examine existing expressions of value.
- A review of briefing and architectural programming literature to examine the nature of clients, the current methods of taking briefs and specifically the management of value in the process.
- Deriving a research proposition based upon the aim.
- A review of research methods to evolve a sound method of experimentation leading to a conclusion of the research proposition

This research is founded upon an international benchmarking study undertaken in 1996/7 and published in 1998. (Male et al 1998a & 1998b). The international benchmarking study involved 65 individuals representing 58 international collaborating organisations in face-to-face benchmarking studies of value management practice. The benchmarking study is important to this research as it represents a detailed study of practice in 1996/7. If a technique of any sort was in use at that time, anywhere in the world, that made explicit the client value system it would be recorded in the published research report. A conclusion of the benchmarking study was that the vast majority of VM/VE studies were being carried out in construction at the sketch design stage with comparatively few studies at the earlier stages of the project. The benchmarking

exercise revealed no technique for making explicit the client value system confirming the literature review. Chapter 2 describes academic work undertaken after 1997 but none, including the recently reported Loughborough University study (2005) attempts to replicate this research aim. The research therefore makes a unique contribution.

Research work into the structured practice of briefing, including a study of architectural programming in the United States, led to the conclusion that briefing was undertaken in two stages which could be identified as the strategic brief and the project brief. The strategic brief is a functional statement of required project outcomes expressed before the decision of what to build is taken. It is at this stage that the client value system is expected to be made explicit.

Therefore, it is the bringing together of research into value management and briefing which leads to the identification of the absence of a method or technique for the overt expression of the client value system although both value management and briefing/architectural programming purport to manage value on behalf of the client. This is the genesis of this research.

1.02 Research proposition

The research proposition is that it is practical to develop a framework for the explicit exposition of the client value system for use in a value management workshop at the strategic briefing of construction projects and that the value system should contain all discretionary variables for the definition of client values at this stage. This proposition is derived in the context of the strategic briefing study being carried out through the medium of a value management workshop.

The thesis is structured as a literature review of value management and briefing with a focus on the expression and measurement of value. The critique of the literature leads to the above research proposition, and an analysis of research methods available for the solution of the research proposition. Initial action research projects highlighted a deficiency in the first iteration of the client value system matrix leading to further literature review and the development of further theory. A more substantial model was tested through 11 value management studies at the strategic end of operational projects.

The evidence in this thesis supports the conclusion that the variables of the client value system are the nine high order discretionary performance variables of:

- CAPEX
- OPEX
- Time
- Esteem
- Exchange
- Environment
- Politics and/or community
- Flexibility
- Comfort.

There are no other discretionary performance variables which are not correlated with these. This conclusion is supported by the research in the chapters of this thesis of which a synoptic review follows.

1.03 Chapter 2 - Value management and value engineering: a review and critique

A detailed review of the literature in the context of construction highlighted a consistency in its approach such that the practice of VM/VE can be summarised as a project focused, team based, function orientated service led by a knowledgeable practitioner or facilitator, using standardised procedures and techniques, with application at a number of points in the project development and based on an understanding of what is of value to the client. It is the description of client value which is highlighted as the one area in which there is a diversity of thinking. The value equations set down by a number of authors are summarised prior to a review and critique.

1.04 Chapter 3 - The briefing process: a review and critique

Chapter 3 is an analysis of the briefing literature focused by six academic reviews of briefing between the period in 1980 and 2003. A number of issues are debated notably client types, the number of stages in the process, and whether briefing should be structured or unstructured. In the context of structured briefing a review of the North American practice of architectural programming, as it is described in the United States literature, characterised a logical structured approach with the aim of selectively seeking

and structuring data in a form conducive to developing a design. In addition to this review a number of briefing guides are analysed for references to client value and its expressive formulation. Guides which exist as computer software are also analysed but found to be a computerised version of existing practice. The analysis of briefing concludes with an assessment of the high level of agreement between the results of the academic surveys and perceptions of the practice of briefing both in the UK and in the United States. However it is concluded in the review that very little attention has been paid within the research and guidance material to the importance of making explicit the client value system.

1.05 Chapter 4 - Synthesis, the research proposition and research methods

A review of value management and briefing leads to the research proposition given above. In order to address the proposition, research methods were examined to determine whether the researcher has choice in the research method used or whether the research method is driven by the nature of the research proposition. The debate concludes that the research method is the choice of the researcher. Having reached this conclusion the various research methods are analysed and related to the proposition. Six possible courses of research action are identified and following a reasoned argument action research was chosen. A reasoned discussion distilled four levels of theory framework illustrated in figure 1.1. The logic of the thesis is illustrated with reference to these four levels.

1.06 Chapter 5 - A theory of value

To build a client value system matrix for testing and analysis, a study is made of the philosophy of value. Literature highlighted the importance of understanding intrinsic and extrinsic value, instrumental value, practical value, moral value, and aesthetic value. A common theme of the authors reviewed is their leaning towards a hierarchy of the variables which make up a value equation. This is a particularly helpful direction in the analysis of methods available for modelling a client value system. The conclusion is the choice of a simple paired comparison approach. At this stage there was an opportunity to trial the value system on a live construction project at the strategic briefing stage. The outcome of the trial demonstrated deficiencies in the model although the paired comparison approach was conducive to the workshop environment.

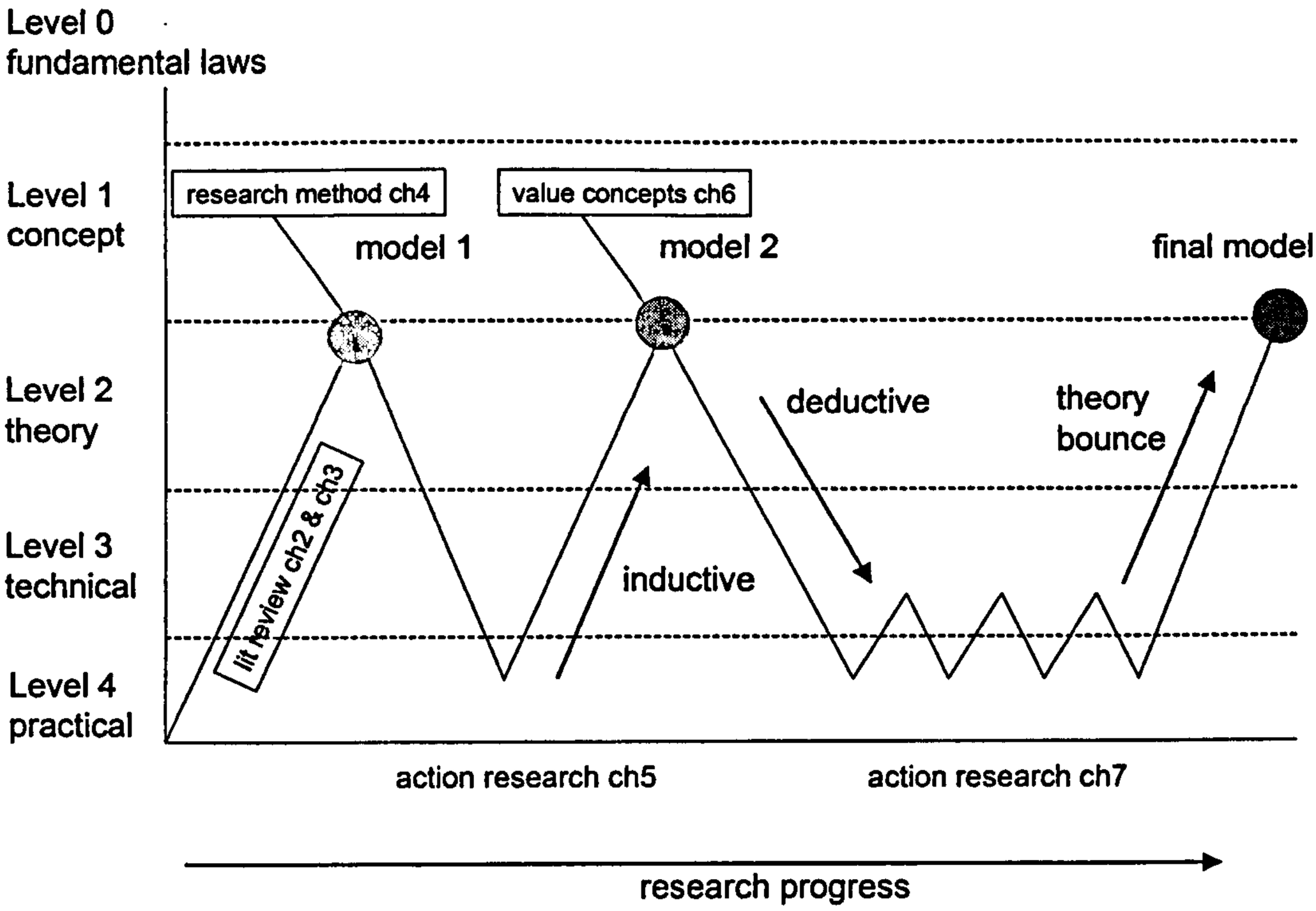


Figure 1.1 Summary of research

1.07 Chapter 6 - Development of the client value system model

The action research study in Chapter 5 highlighted the necessity for a detailed study of quality and value, key performance indicators, and the relationship between the client value system and value chains in construction. These were undertaken with reference to previous research developing an illustrative model of the corporate decision to build with the appropriate input of client values. Further analysis leads to the development of a client value system matrix suitable for testing within an action research environment.

1.08 Chapter 7 - Action research studies

Action research studies were undertaken on construction projects either at the strategic briefing stage or addressing issues of strategic briefing at a slightly later stage. The

studies reflected a variety of client types, involved with differing projects in terms of characteristics and cost, and procured under a number of procurement systems. Some slight variations were made to the model during the period of testing but in the main the model was found to be robust.

1.09 Chapter 8 – Discussion, conclusion and recommendations for further work

The primary conclusion confirms the proposition that it is practical to develop a framework for the explicit exposition of the client value system for use in a value management workshop at the strategic briefing stage of projects and that the value system can contain all discretionary variables for the definition of client values at this stage.

During the research a number of attractive research opportunities presented themselves and these are described. This work is at the beginning of research into the client value system and notwithstanding the recently completed work at Loughborough University (2005) is unique.

1.010 References

Male S, Kelly J, Fernie S, Grönqvist M, and Bowles G (1998a) *The value management benchmark: a good practice framework for clients and practitioners*, Thomas Telford, London.

Male S, Kelly J, Fernie S, Grönqvist M, and Bowles G (1998b) *The value management benchmark: research results of an international benchmarking study*, Thomas Telford, London.

Austin, S, Thomson, D and Mills, G *Value in Design* Loughborough University from http://www.valueindesign.com accessed 11th Sept 2005.

Chapter 2 Value Management and Value Engineering a Review and Critique

2.01 Introduction

The evolution of value analysis is consistently recorded by a number of the early writers (Crum: 1971, O'Brien: 1976, Fallon: 1980). During World War II a shortage of strategic materials led the allied governments to require that such materials be reserved for the armaments industries. In the USA, manufacturers producing non-military goods were obliged to use alternative materials and at GEC Philadelphia, Harry Erlicher, chief purchasing officer, became responsible for sourcing supplies. To guarantee specified performance from the alternative materials some redesign work was necessary. In some cases the substitute materials achieved equal or better performance at lower cost. Erlicher decided that a process should be evolved to ensure that lower cost alternatives were discovered by intent rather than by chance.

Lawrence D Miles, purchasing agent for a division of GEC located in Baltimore was assigned the task of developing such a system and in 1947 completed the development of a systematic functional approach to cost reduction which he called value analysis. The undertaking of value analysis necessarily required interaction with other departments within GEC and therefore a team approach to analysis was evolved to aid efficiency.

The foundation for value studies were therefore, analysis of function, cost and the team approach. Value management can be considered to have undergone three phases of development. The first phase from 1947 to 1972 involved its development within manufacturing, initially within the USA but during the 1960's it become adopted internationally. The second phase of development in the context of this thesis was between 1972 and 1989. During this period value engineering had become the preferred term and this spread to the construction industry. 1989 to the present day was the period during which value management became the most widely used term in Europe. There was development of the founding principles beyond pure engineering into strategic management. The date for this watershed is chosen as 1989 to reflect the

influence of the European Community strategic programme for innovation and technology transfer (SPRINT) working group on value analysis.

2.02 Definitions & terminology – phase 1 1947 to 1972

During the first phase of its development value analysis was restricted to its practical application within manufacturing with little focus on academic scrutiny. Texts up to 1972 (Crum: 1971, Gage: 1967, Miles: 1961, Mudge: 1971) describe the process without a formal structured definition. The synoptic definitions (Kelly and Male: 1993 p8) of value analysis for this period are "an organised approach to providing the necessary functions at the lowest cost" and "an organised approach to the identification and elimination of unnecessary cost". In the latter definition "unnecessary cost" is "cost which provides neither use, nor life, nor quality, nor appearance, nor customer features".

In 1954 the US Department of Defence's Bureau of Ships became the first US government organisation to implement a formal programme of value analysis. It was at this time that the term "value engineering" came into being for the administrative reason that engineers were considered to be the personnel most appropriate for this programme. (Parker: 1977). Crum (1971) an early UK author of value engineering saw the work of Miles (1961) as value analysis because it focused on an existing product. Value engineering was the correct term in the context of a developing design. The formation of the Society of American Value Engineers in 1959 established the term value engineering, which came into common use as the preferred term and is the term most used in the USA today. Also in 1959 value engineering was endorsed by the new Secretary of State for Defence, Robert McNamara formerly of the Ford Motor Company.

Value engineering reached Europe during the 1960s. The first recorded major programme (Crum: 1971 p8) in the UK started at the Dunlop Company in 1961 and by 1966 value engineering was prevalent in many manufacturing organisations. The Value Engineering Association was formed in the UK in 1966 and held its first conference in 1967.

2.03 Definitions and terminology – phase 2 1972 to 1989

During its second phase of development value engineering spread to construction and began to penetrate other countries. The first reference to its introduction to construction (Dell'Isola: 1974) was the US Department of Defense, Navy Facilities Engineering Command in 1963. In 1973, at the thirteenth SAVE conference, it was estimated that over half of the audience were from the construction industry (O'Brien: 1976 p3). Also by 1973 the technique was well embedded in US Government agencies concerned with construction (Parker: 1977). The worldwide dissemination is illustrated by the publication by the Australian Department of Defence of manual DRB 37 Value Analysis (1983 p2-1) which retains the tenor of the original definitions of value analysis as "the systematic effort directed at identifying the functions of systems, equipment, facilities, procedures and supplies for the purpose of achieving the essential functions at the lowest cost consistent with the needed purpose, performance, reliability and maintainability".

Szöke and Dandri (1980) undertook a three-and-a-half-year study on behalf of CIB W55 of value engineering in the construction industry reporting in 1980 that USA, Canada and Japan were countries of widespread application with 24 other countries reporting intermittent application typified by the French experience of the sporadic development which waxed and waned over the period. In 1972 the UK Value Engineering Association became the Institute of Value Management but by the late 1980's it had become moribund with a membership of less than 10. Kelly and Male (1988) reported on an RICS Education Trust sponsored study on the relationship between value engineering and the quantity surveying practice of cost management. A recommendation of the report was that the term value management should be used in preference to value engineering although at that time the terms were seen to be synonymous.

2.04 Definitions and terminology – Phase 3 1989 to 2005

During the third phase of development, interest in value management grew within the construction industry and along with the interest came a debate over definitions and terminology. Over the period a level of consistency has developed internationally on the meaning of the various terms and also of the nature of the endeavour.

In the USA the term value engineering was seen to be restrictive and in 1997 the Society of American Value Engineers renamed themselves SAVE International. At the same time a value methodology standard was introduced which subsumes the terms value analysis, value engineering and value management (SAVE International: 1998 p1).

Norton and McElligott (1995: p7 -8) consider that value management is a higher order title and is not linked to a particular project stage at which value techniques may be applied. They go on to define; "value planning" as the title given to value techniques applied during the planning stages of a project, "value engineering" as the title given to value techniques applied during the design or engineering phases of a project and "value analysis" as the title given to value techniques applied retrospectively to completed projects to analyse or audit the project's performance. Other authors concur with these definitions.

In the UK value management is defined as:

- a service which maximises the functional value of a project by managing its development from concept to completion and commissioning through the audit (examination) of all decisions against a value system determined by the client. (Kelly and Male: 1993: p4)
- a systematic, multi-disciplinary effort directed toward analysing the functions of projects for the purpose of achieving the best value at the lowest overall life cycle project cost (Norton and McElligott: 1995 p11)
- the value process during the concept, definition, implementation and operation phases of a project [which] encompasses a set of systematic and logical procedures and techniques to enhance project value throughout the life of the facility. (ICE: 1996 p2)
- a structured approach to defining what value means to a client in meeting a perceived need by establishing a clear consensus about the project objectives and how they can be achieved. (Connaughton and Green: 1996 p2)
- incorporating value engineering which is a systematic approach to delivering the required functions at optimum whole life costs without detriment to quality performance and reliability. (CIB:1996)

- the integration of proven and structured problem-solving techniques..... implemented by a multi-disciplinary team under the guidance of a knowledgeable value practitioner to seek out the best functional balance between the cost, reliability and performance of a product or project. (Thiry: 1997 p10)

The definitions contained here and as stated within the value engineering and value management (VM/VE) texts are sufficiently consistent to be able to isolate the salient features as being:

- project focused.
- team based.
- led by a knowledgeable practitioner or facilitator
- involving the use of procedures and techniques
- with application at a number of points in the process
- function orientated
- based upon understanding what is of value to the client.

2.05 Value management and value engineering texts

There is group of US value engineering and value management (VE/VM) texts in manufacturing (Fallon: 1971, Miles: 1961, Mudge: 1981) and construction (Dell Isola: 1974, Macedo, Dobrow & O'Rooke:1978 O'Brien:1976 Parker: 1985, Zimmerman and Hart, 1982) which have a very similar outlook on the practice of VE/VM. They propose the same basic structures and use almost identical methodologies. In situations where they can be referred to collectively they will be referred to as the US VE/VM texts.

2.06 Project

The US VE/VM texts and others (Crum: 1971 UK, Gage: 1967 UK, Venkataramanan: 1991 India, Adam: 1993 Australia, Mohd Mazlan: 2002 Malaysia) refer to the project but none discuss the place of the project within the client's business. The projects described within the texts are commonly the value analysis or value engineering of a product or service but the background to the product or service or indeed its context within the client's business is withheld.

The Oxford English Dictionary (OED) defines a project as being a plan, a scheme, or a course of action. Borjeson (1976) defines a project as "a temporary activity with defined goals and resources of its own, delimited from but highly dependent upon the regular activity". Morris and Hough (1987 p3) define a project as "an undertaking to achieve a specified objective, defined usually in terms of technical performance, budget and schedule". Therefore, a project is the "investment of resources for return", where the investment is defined as being financial, manpower and/or material and the return commercial or social. This is a useful definition, as it does not restrict the project to any particular sector.

The essence of all of these definitions is the recognition that the investment in a project is undertaken to add value to the core business of a client. The project has by definition a start date, a completion date, resources for its undertaking, a method for its smooth integration into the core business, and, ideally performance indicators which allow its impact on the core business to be measured (Standing: 2001 p15). The relationship of the project to the core business is illustrated in Figure 2.1.

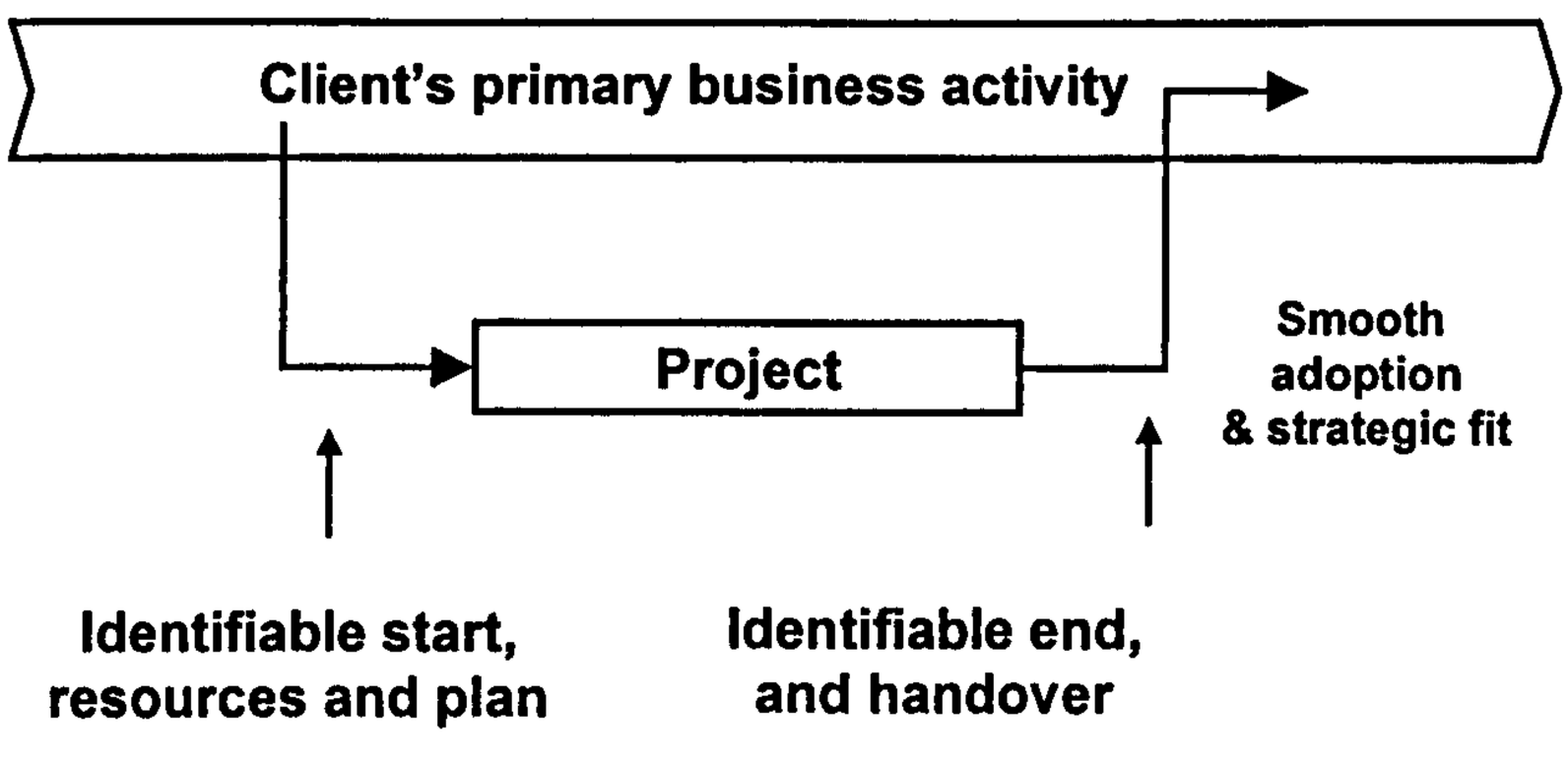


Figure 2.1 The relationship of the project to the core business

2.07 Teams and facilitation

VM/VE literature generally is consistent in its description of the requirements for the team and its leadership. Male, Kelly et al (1998a: p18) record that facilitation is a

fundamental critical success factor in the application of VM/VE. The team debate is typified by McGeorge and Palmer (1997:p30) who indicate a facilitated team of maximum 8, Parker (1994: p31) who states that the optimum size for a multi-disciplined team is five persons with support, on a part-time basis, from people from within the organisation or outside experts and consultants to achieve different points of view. Shillito and De Marle (1992: p278) state that a VM/VE team normally comprises three to seven interdisciplinary members incorporating a good balance of background and disciplines. Members should be from equivalent levels in the organisation's hierarchy in order to minimise peer pressure and politics and should include a decision-maker. Fallon (1980: p193) concurs with a similar debate with numbers of 4 to 6 (men) in each task group team. Norton and McElligott (1995: p34) state that a VM team is a group of 6 to 12 individuals who collectively are able to authoritatively analyse all aspects of the project under review. Kaufman (1990: p11) states that the project or problem determines the discipline mix of team members charged with the responsibility of resolving a problem. Four to seven team members should be drawn from those who own the problem, who are charged with resolving the problem and those who are affected by the solution to the problem.

A team is defined by Hellriegel, et al (2001: p238) and Cook et al (1997: p315-348) as a type of group with complementary skills, competencies and knowledge, who are committed to a common purpose, set of performance goals and approach for which they will hold themselves mutually accountable. A team engages in collective work and through co-ordinated joint effort produces results that are more than the sum of the individual efforts. A team is characterised by a shared commitment by the members to their collective performance and this requirement influences how they will work together to accomplish the team's goals. Empowerment is therefore an important feature of team working and the limits of that empowerment need to be fully understood by each member of the team. Teams are either permanent or temporary.

The size of an effective team can range from two members to an upper limit of about 16 members although 12 members is probably the largest size that allows each member to interact easily face-to-face (Hellriegel et al: 2001 p238).

The VM/VE texts describe the importance of properly trained facilitators for value management studies.

2.08 Procedures and techniques

A characteristic of North American value engineering is the team approach to creativity through the application of the job plan; a logical, sequential, approach to the study of value. The US VE/VM texts refer to a pattern derived from Miles' original work (1961) which is summarised in Figure 2.2. It is to be noted that Miles was solely concerned with manufacturing and this is reflected in his Job Plan. Those subsequent authors whose concerns included construction modified the job plan to accord with the processes and terminology of the industry.

Phase 1: Orientation asking; what is to be accomplished, what does the client need and/or want, what are the desirable characteristics?

Phase 2: Information secure all, costs, quantities, drawings, specifications, manufacturing methods, samples and prototypes. Understand the manufacturing process. Determine the amount of effort which should reasonably be expended on the study.

Phase 3: Speculation generate every possible solution to the identified problem using brainstorming sessions. Record all suggestions.

Phase 4: Analysis estimate the dollar value of each idea and rank in order of highest gain and highest likely acceptability. Investigate thoroughly the best ideas.

Phase 5: Programme Planning establish the manufacturing programme by identifying operations, design and production personnel, suppliers, etc. Promote an ethos of creativity in all involved parties.

Phase 6: Programme Execution Pursue the programme, evaluating and appraising further suggestions from suppliers, etc.

Phase 7: Status Summary and Conclusion If in a position to take executive decisions then act on new ideas, if not make recommendations to those who are to make the decision.

Figure 2.2 - Miles' original Job Plan (1961)

2.09 Function analysis

Another area of consistent agreement within the VM/VE literature is the requirement for the processing of information gathered through logic structuring in a Functional Analysis System Technique (FAST) diagram. This technique was evolved by Charles

Bytheway (1965) as an aid to information gathering. The form of diagramming is developed in Snodgrass & Kasi (1986) and Kaufman (1990) and replicated in most other texts. Although not a feature of Miles' first edition, North American practice has evolved a tradition that functions be recognised in a simple verb plus noun form. A wall for example may have the functions; support roof, repel weather, maintain temperature etc. It is these functions that the team will answer in terms of technical solutions.

Development of the work in function analysis as a methodology for group decision support has been undertaken by Green (1992 & 1996). This has moved the work pioneered by Bytheway (1965) and developed by Kaufman (1990) into an analysis of group decision techniques and the development and validation of a group decision support methodology based upon hierarchical structures.

2.010 The 1998 benchmarking study

The 1998 value management benchmarking study was an EPSRC funded collaborative study between University of Leeds and Heriot-Watt University with the aim of synthesising the best of VM/VE practice internationally and presenting it in the form of a value management benchmark. There were three outputs:

- Male S, Kelly J, Fernie S, Grönqvist M, and Bowles G (1998a) The value management benchmark: a good practice framework for clients and practitioners, Thomas Telford, London
- Male S, Kelly J, Fernie S, Grönqvist M, and Bowles G (1998b) The value management benchmark: research results of an international benchmarking study, Thomas Telford, London
- An interactive CD Rom

Sixty five individuals representing fifty eight international collaborating organisations contributed to the study through face-to-face benchmarking sessions, giving high confidence in the benchmark of VM/VE as it was practiced in 1996/7.

The study determined; the characteristic workshop opportunities in a construction project; the activities undertaken in each characteristic workshop; the tools and techniques used at each stage; the issues surrounding qualifications, certification,

legislation and the professional development of value management and some observations concerning practice within the public and private sectors.

Points in the project process for the application of value management

Kelly and Male (1993) identified four levels in the project delivery process as illustrated in figure 2.3. It was presumed that these levels would have a direct impact on the form and type of value management workshop.

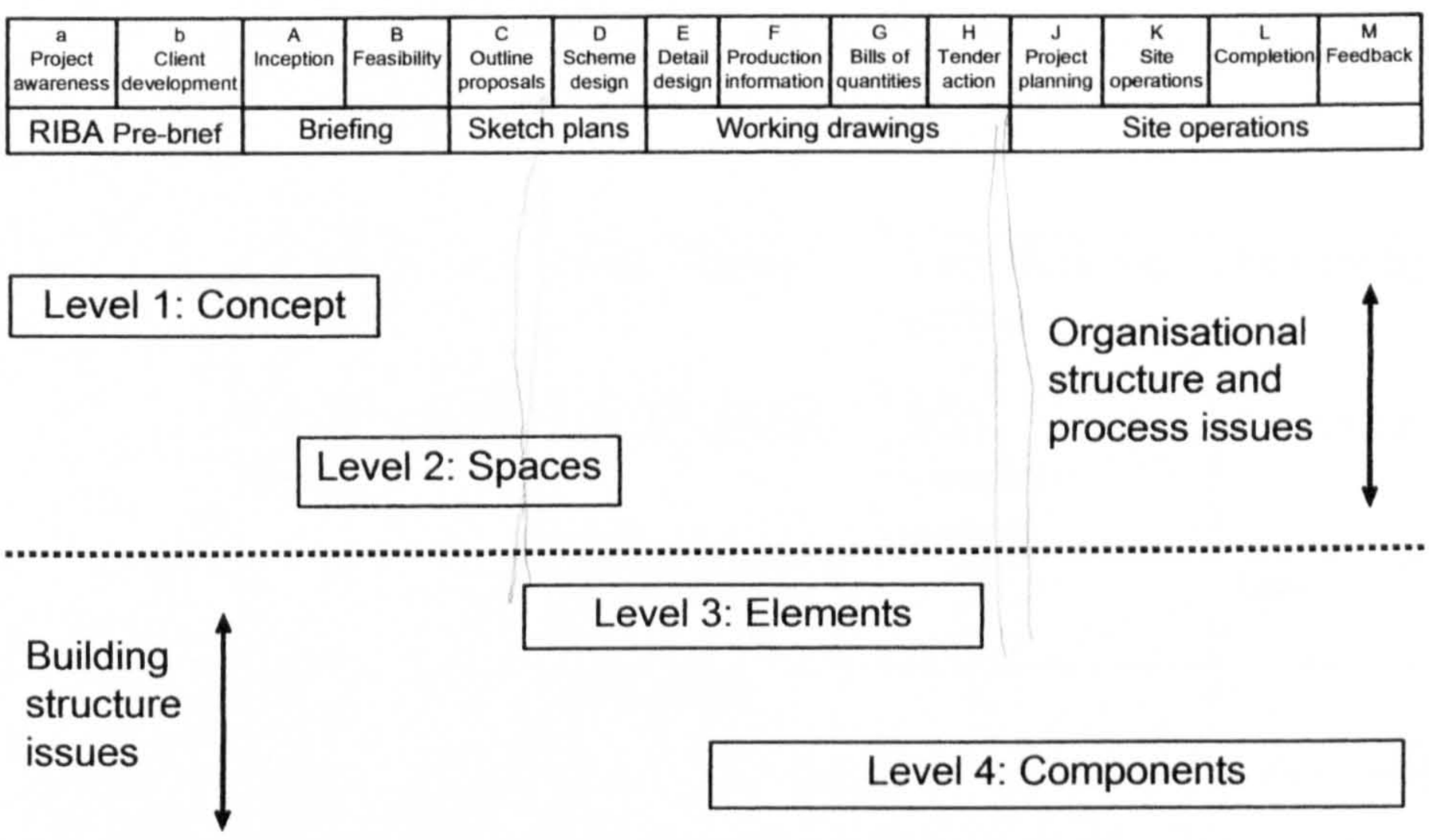


Figure 2.3 Activity levels in construction process (source Kelly and Male: 1993 p160)

The levels are described as;

- concept, the point at which a decision to proceed with a project is taken and the formulation of the strategic brief and outline business case undertaken;
- spaces, when the size, adjacency, servicing and finishings of spaces are defined in the project brief;
- elements, when the building takes a geometric form, elements are identified, a cost plan configured and a full business case completed.
- components, when the detailed design of elements is undertaken.

Contemporary literature all dated 1996 largely confirmed these intervention points. These are summarised in Figure 2.4

ICE *Creating value in engineering design and practice*	**CIRIA** *A client's guide to value management in construction* (Connaughton & Green)	**HM Treasury** CUP No 54 *Value management*	**BSRIA** *Value engineering of building services* (Hayden & Parsloe)	**Draft European Standard –** (became BS EN 12973:2000) *Value management*
VP1 - Early Concept	VM - Concept	Option Appraisal and Business Case	VM1 – Inception/ definition	Inception
VP2 - End of Concept - develop a brief	VM - Feasibility	Outline Design	VM2 – Outline proposals	Concept
VE1+ - Post Brief	VE - Scheme Design	Final Sketch Plan	VE1- Scheme design	Feasibility
	VE - Detailed Design	Detail Design	VE2 – Detailed design	Implementation
		Construction		Use
		Handover		

Figure 2.4 - Value Management / Value Engineering intervention points

At the same time the US Society of American Value Engineers *(*SAVE*)* advocated the application of VE as early in the design cycle as is feasible and indicated that value studies could be conducted at two stages.

1. Schematic stage
2. Design Development (45%)

The Australian and New Zealand Standard AS/NZS 4183:1994 took a broader view encompassing what seemed to be the whole of the construction supply chain identifying six stages:

1. Project Concept
2. Client Brief
3. Site Selection
4. Design Proposals
5. Material Selection

6. Construction Programs
7. Construction Methods
8. Facility Management

The post benchmarking conclusion of 1998 (Male et al: 1998) was that there are characteristically 6 points for the application of VM/VE.

1. The pre-brief workshop where the focus is on the definition of the project in functional terms without a presumption of what to build. At this workshop the concept is established and sufficient understanding of the project for the preparation of the outline business case. CIB (1997) refer to this stage as the compilation of the strategic brief.

2. The brief workshop where the strategic brief is confirmed (or evolved if a pre-brief workshop had not been held) and a project brief developed. The project brief is space orientated. The output of the workshop is a description of the space requirement in functional terms together with adjacency relationships, definitions of size to meet function, service and IT support and required level of finishes. This data becomes the foundation of the room data sheets.

3. The concept design workshop is a review of the outline scheme to date. It has two functions, firstly to audit the developing design against the strategic and project brief and secondly to be innovative in improving the design through the examination of options.

4. The "Charette" is a particular form of workshop which amalgamates the pre-brief, brief and concept design workshops. In the absence of these workshops it is the first value management intervention and is an audit of the progress on the project to date. Involved in the workshop are those from the client organisation who have contributed to the brief and the full design team.

5. The detailed design workshop is a technical workshop which considers the function and cost of space and elements. This is the form of workshop which is the mainstay of US value engineering.

6. Operational studies are workshops held either during the latter stages of detailed design or post contract or post package tender. They involve the design team and the main or package contractor in a short workshop to find efficiencies in manufacture and/or construction.

Whilst there was evidence to suggest that value management was conducted beyond the construction stage, there was infrequent mention in fieldwork discussions, as was the case with facilities management. Each of the value opportunity points has been identified in figure 2.5. The figure relates the opportunity points to the RIBA Plan of Work, the AIA Design Process and the 1999 RIBA Plan of Work.

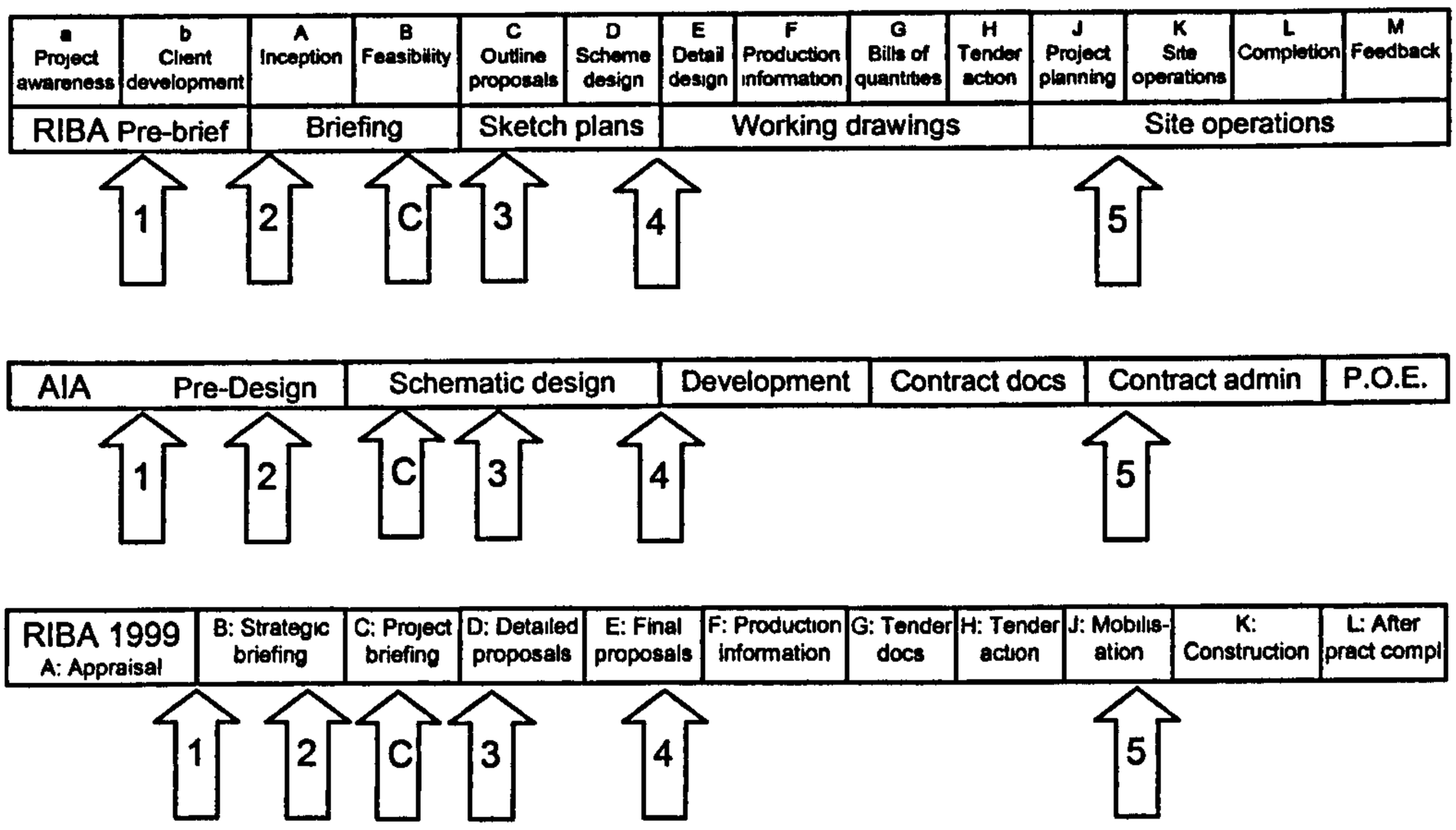


Figure 2.5: Value opportunities with reference to AIA and RIBA processes

Benchmarked requirements for a successful value management process

The benchmarking exercise determined a series of pre-requisites to ensure a smooth running workshop. These relate to the involvement of people and the venue for the workshop and include:

- Agreement to participate by all parties involved in the workshop
- Senior management support for value management.
- An experienced and independent facilitator(s).

- An appropriate team skill mix
- The presence of client decision taker(s).
- An isolated workshop environment.

A number of benchmarking partners highlighted the necessity for pre workshop orientation, either as a data gathering exercise by the value management facilitator or through a pre-workshop meeting to:

- Gather information
- Elicit views and opinions of key stakeholders and project specific participants
- Help to define workshop scope
- Identify project constraints
- Contextualise the value problem within both the "business" and project delivery process and
- Brief the workshop team on the purpose and agenda for the workshop.

Conclusion of the 1998 benchmarking study

The conclusion of the benchmarking study was that value management is a team based, facilitated, problem solving service which used a number of recognised tools and techniques at specific points in the evolution of the project. The original Miles job plan was generally followed with function analysis playing a key role. The Kelly and Male "project levels" illustrated in figure 2.3 were robust and useful in comparing the chronology of value management activity. The definition of workshops was refined and the activity within each workshop clarified as an output of the study.

At the time of the benchmarking study, the majority of activity, particularly in USA, Canada, Japan and Korea was at value opportunity point 4, detailed design (diagram 2.5). In the UK the "Charette" was considered the most common style of workshop. Activity in Australia was mixed but in New South Wales there was emphasis by one organisation on the strategic briefing stage. The French and German focus was on manufacturing with emphasis on value engineering at detailed design but with some earlier application through functional specification (Janin: 1989)

2.011 Client value

Client value is one area where there is some diversity of thinking. The most common expression (O'Brien:1976 p16, Crum: 1971 p14, EUR 14394:1993, ICE: 1996 p3, Hayden and Parsloe: 1996 p5, RJ Park: 1999 p96) is that value (v) has a relationship with function (f) and cost (c), most usually expressed in mathematical terms as:

$$value = \frac{function}{cost}$$

The division shown above is an accurate representation of the units of function which can be obtained for a unit of cost. Bone (1992) in his application of value management to the UK local authority sector uses the same equation.

Adam (1993 p176) defines value as the lowest cost to reliably perform a function where the definition of function is that which the product process or system delivers to make it work and sell, the definition of basic function is the specific reason why the device was designed and made.

Norton and McElligott (1995 p13) define value as a relationship between cost, time and function. They state that in a value management study the objective is to improve value through the balancing of cost, time and function which can be achieved in three ways:

- to provide for all the required project functions but at a reduced cost
- to provide additional desirable project functions without adding to the cost
- to provide additional desirable project functions while at same time reducing costs

Kaufman (1990 p1-5) defines value as:

$$v = \frac{want + worth + need}{cost}$$

Where want is equivalent to esteem value, worth is equivalent to exchange value and need is equivalent to utility value.

Parker (1994: p40) concurs with Kaufman by describing want as relating to esteem value, worth as relating to exchange value and need as relating to use value but describes a value index as being represented by function cost divided by function worth.

$$value index = \frac{function cost}{function worth}$$

Crum (1971 p14) and Mudge (1996 p13) define enhanced value as the lowest cost to reliably provide the required functions or service at the desired time and place and with the essential quality. Value is a measure of the consumer satisfaction with the goods or services purchased in terms of their quality, reliability and price. They also concur in their definitions of "use value" as those properties of an object or service which accomplish the desired task, "esteem value" as those properties that make ownership of an object desirable, "cost value" as the sum of labour, material, overhead and other costs, and finally "exchange value" as the properties of an object that make it possible to procure other items by trading. Crum also refers to a value opportunity as represented by use value plus esteem value divided by price.

$$value opportunity = \frac{use value + esteem value}{price}$$

Thiry (1997 p9) defines "use value" as the amount of resources expended to realise a finished product that performs as it was intended; "esteem value" as the amount of resources a user is willing to expend for functions attributable to pleasing rather than performing; "exchange value" as the amount of current resources for which a product can be traded.

"Cost value" is the amount of resources expended to achieve a function measured monetarily and "function value" as the relationship of function worth to function cost. Customer value is defined as the needs, plus objectives, plus targets, divided by the maximum overall resources expended.

$$customer value = \frac{needs + objectives + targets}{resources}$$

Thiry also illustrates a value fulcrum with offered quality divided by expected quality balanced by available resources divided by required resources. The European Value Management Handbook (European Commission: 1995) presents a similar relationship of needs and resources.

Fallon (1980 p19-34) defines value to the producer as function divided by cost but value to the buyer as perceived benefits divided by price.

$$valueproducer = \frac{function}{cost} \qquad valuebuyer = \frac{benefits}{price}$$

Fallon quotes Adam Smith's paradox of value that extremely useful goods such as water have little or no exchange value whereas certain other goods such as diamonds have great exchange value though little use value. Fallon also describes the four most significant aspects of product value as being; use value, esteem value, market value, and exchange value.

Fallon (1980 p23) and Shillito and De Marle (1992 p14) debate the difference between "value" and "worth". Both refer to the source of "worth" as being from the Anglo-Saxon word "weorth" relating to an expression of individual importance. Fallon describes the value of products as being determined by a relationship of worth to cost which conforms to the customer's wants and resources in a given situation. Describing value both Fallon, and Shillito and De Marle refer to the French "valoir" and its relationship with exchange in the market place. In value management terms this is a useful debate as worth is commonly interpreted to represent the cost of providing only the utilitarian function i.e. without consideration of aesthetics.

Shillito and De Marle (1992 p9) define value as:

$$value = \frac{need * abilitytosatisfy}{cost}$$

This is an equation for individual value which relates to an individual's rating of the importance of the need and the ability to satisfy. A customer's perception of value uses the same equation but the denominator is price. As this value equation is related to

individual perception of value it is more closely associated with "worth". In an enterprise involving a number of individuals the value equation becomes:

$$value = \frac{\sum worth1 + worth2 + worth3 + worthn}{n}$$

Miles (1989 p4) defines value in the context of a product or service by stating a product or service is generally considered to have good value if that product or service has appropriate performance and cost. Value is always increased by; decreasing costs and maintaining performance, and by increasing performance if the customer needs and wants increased performance and is willing to pay for more performance.

McGeorge and Palmer (1997 p23) state that good value is achieved when all functions are accomplished at the lowest achievable cost. When no function is achieved, unwanted functions are provided or where function is achieved at too great a cost there is little or no value.

Zimmerman and Hart (1982 p61-2) recognise four types of value: use value, esteem value, exchange value and cost value.

BS EN 1325 - 1: 1997 defines value as the relationship between the contribution of the function (or value analysis subject) and the satisfaction of the need and the cost of the function (or value analysis subject). There are then following three notes:

- Note 1 - the term value is also used when factors other than cost are considered, such as reliability, weight, availability of resources and time.
- Note 2 – in the original value analysis meaning, value is the ratio between functions and cost.
- Note 3 - this definition mainly concerns the value for a specific user (value can be different for different users). The cost of the function (or value analysis subject) is the cost (or price) the user pays. When the value is considered for the producer, the cost taken into account is the cost of production.

BS EN 12973: 2000 refers to the definition of value in the previous standard as the relationship between the satisfaction of need and the resources used in achieving that satisfaction. Therefore value has a relationship between satisfaction of needs divided by

satisfaction of resources. The standard also states value is not absolute, but relative, and may be viewed differently by different parties in different situations. Generally achieving good value requires balancing a series of conflicting parameters to arrive at an optimum position.

2.012 Review and critique

This chapter has described the development and maturation of the value management structure as it is described in the value management literature. From an analysis of the salient features VM/VE is:

- project focused.
- team based.
- led by a knowledgeable practitioner or facilitator
- involves the use of "job plan" procedures and techniques
- has application at a number of points in the project development process
- function orientated
- based upon understanding what is of value to the client.

Where there is consensus and where literature from non value management sources concurs is in the areas of teams and facilitation. The VM/VE texts agree on the procedures and techniques and the definition of function.

Where the texts are silent or do not concur is in the areas of:

- the nature of projects and project focus including particularly the application of VM beyond manufacturing and construction and especially considering the service sector. Bone addresses the public sector but in terms familiar to the mechanical engineer (Bone:1992)
- the application points in the context of construction and particularly at strategic and project briefing and
- the understanding of the client value system.

The review of value engineering and value management in this chapter has made extensive use of texts written by practitioners. Value engineering in the USA has been, and still is to a large extent, driven by practice. The formation of the Society of American Value Engineers by the value engineering practitioner community purports to

protect the consumer of value engineering services through a qualification system that recognises technical expertise. However, the focus on the technical excellence of a technical service restricts academic free-thinking and there is little research activity in value engineering within research communities in the USA.

In Hong Kong a paper by Fong and Shen (2000) reports on a survey based research project on the adoption of value management in Hong Kong. At the time of the survey the perception of value management was that it was a technical process focused entirely on construction activity. The conclusion of the paper was that if value management were to stay in this mould then it would be of very little interest in Hong Kong where asset management and particularly land pricing plays such an important role in the investment decision that the technical solution to the engineering problem of construction is of very minor importance.

The early work of Kelly and Male (1988) focused on the methodology of US value engineering and considered its possible application within the context of a UK construction industry. As a consequence of the description of US value engineering in procedures, tools and techniques the early critique by Kelly and Male (1993 p69) tended to be similarly termed. Green (1992 p5-7) having described in detail what Kelly and Male preferred to call value management has been consistently critical e.g. Green (1999) considers that the research work was embedded in the area of hard value management whereas the opportunities lie in the development of techniques for the solicitation of information and processing of that information in terms of soft techniques. However, Green (1999) makes some useful comments stating

> 'The concept of group decision support is derived from the emerging paradigm of soft operational research where the key is the explicit recognition that individuals will make sense of situations in different ways and yet invariably need to act in a collective manner. The implied assumption by Kelly and Male is that the client is unitary and that a consistent "value system" exists which can be modelled. There is no overt acknowledgement that the very process of modelling will inevitably influence the values and perceptions of the workshop participants. The implication is that the "functional value" of a project indeed exists independently of the conflicting and transient aspirations of the projects stakeholders. It is seemingly taken for granted that the clients "value system" can be analysed in the same dispassionate way in which one would manipulate a quadratic equation. The underlying epistemology is that of positivism'.

The comment is useful because although it incorrectly reports a presumption that the client is unitary (described in opposite terms in Kelly, et al (1992)), it does succinctly and correctly summarise the early perceptions with regard to value.

Green was not the only researcher of that time considering the principles of value management and extending them into softer and more strategic areas. The PhD research of Bell (1994) linked corporate and customer values through a strategic project management framework which was developed and tested within BAA plc. The most attractive area for academics however has been that of decision support systems. Green (1992) developed a system for weighting and scoring within function diagramming or, as it is known within operations research (OR), operational hierarchies. This work has been developed over a number of years typified by the action research experiments in group decision support systems (GDSS) described in Green (1999). Eden C (1995) supports Green's carefully conducted action research highlighting some of the doubt circulating within the operational research community at that time. Eden addresses criticisms within the OR community that there is no empirical research to substantiate the claims made by the proponents of GDSS methods, and the apparent paradox that the methods are only successful when used by their proponents. Eden also highlights the fact that group decision support systems are designed to work within complex organisational environments and tackle complex strategic issues but that they do so in the absence of clear success criteria. Concluding the debate Eden advocates more properly constructed and validated action research.

Shen and Chung (2002) and Shen, et al (2004) describe the application of decision support system technology to value management problems. They highlight the fact that lack of information is the most frequently encountered difficulty in value management studies and that the project information centre, a part of the GDSS system, mitigates this problem by obtaining and circulating rapidly information from various sources including the Internet. The 2004 paper consolidates the work and concludes that support for a value management workshop lies in four areas; discussions support, which facilitates the exchange of ideas and involves reluctant participants; information support, which improves the availability and quality of information; decision analysis, which improves the efficiency and effectiveness of data processing; and collaboration support, which facilitates the co-ordination between members to support team work.

Liu and Leung (2002) adopt a similar philosophical approach to Green criticising traditional value engineering's approaches to economic and function analysis to solve hard technical problems and advocating a soft approach. As Green they rely heavily on soft systems methodology to evolve a goal - behaviour - performance – outcome paradigm to value management in which they link the value system of the client to goal specificity. They argue that goals are established from value judgements and that value importance dictates goal prioritisation and is also a constituent of goal commitment. Their proposed model attempts to find the value gap through an objective setting procedure in which the participant's psychological needs and desires are considered. It is this value gap analysis which is used to resolve any conflicts between value specificity and goal specificity. The work is theoretical and has not been tested in practice.

The early development of value engineering in manufacturing used hard systems and a structured process, the systems being described in the main by practitioners. The systems were developed empirically and those that were found to work advocated and used without critical academic debate. Green is highly critical of the hard systems approach however it has its place within the engineering systems of manufacturing and construction. It could be argued however that hard systems have a restricted place in the value management of service sector projects. The challenge across all sectors is in the proper configuration of the project goal. To paraphrase a recent statement made by Neil Smith of Jaguar Cars Ltd, (Smith: 2005) the engineering is relatively straightforward, it is the more strategic requirements of evaluating new projects in the context of the customer value criteria which is difficult.

The benchmarking study (Male et al: 1998a & 1998b) exposed the extent of the development of value management in 1996/7 against which further development can be measured. Academic advances have sought to apply soft systems methods and soft operational research techniques to value management in the formative stages of projects recognising the importance of correct goal setting. In the context of construction the strategic brief and project brief are those areas which offer the greatest development potential. This shifts the focus from the engineering aspects of construction to goal setting and the realisation of the client value system. As described above a number of authors have attempted to represent the value equation. Thiry (1997) and Shillitoe and De Marle (1992) strive for mathematically sound expressions of value however the

majority believe the concept of value is purely a concept. That projects have value is certain whether that value is developed independently of the client value system is open to question as is the relationship between a client value system and the smooth integration and commercial or social performance of projects within client organisations. The client value system, to be effective, needs to be made explicit during the early development stage of the project, although this is unlikely to be "analysed in the same dispassionate way in which one would manipulate a quadratic equation" (Green: 1999). If the value management opportunities lie within the briefing stage then the briefing stage of construction projects needs to be well understood for value management to be integrated in a rational manner. Chapter 3 explores the briefing process and specifically the client value system.

2.013 References

Adam, E 1993, *Value management: cost reduction strategies for the 1990's,* Longman Professional Publishing, Melbourne.

Australian/New Zealand Standard 4183: 1994, *Value management,* published jointly by Standards Australia and Standards New Zealand.

Bell, KL 1994, *The strategic management of projects to enhance value for money for BAA plc* Unpublished PhD Thesis, Heriot-Watt University

British Standard BS EN 12973: 2000, *Value management*, British Standards Institution.

British Standard BS EN 1325-1: 1997, *Value management, value analysis, functional analysis vocabulary, part 1: value analysis and functional analysis,* British Standards Institution.

Bone, C 1992, *Achieving value for money in local government: meeting the charter's challenge,* Longman Industry and Public Service Management, Harlow, UK.

Bytheway, CW 1965 Basic function determination technique, *Proceedings of Society of American Value Engineers Conference*, April, Vol 2 21-3. (From McGeorge and Palmer)

Connaughton, J and Green, S D, 1996, *Value management in construction: a client's guide,* Construction Industry Research and Information Association, London.

Construction Industry Board, 1996, *Factsheet on value management*, Construction Industry Board, London.

Construction Industry Board, 1997, *Briefing the team: working group 1*, Thomas Telford, London.

Cook, CW, Hunsaker, PL and Coffey, RE 1997, *Management and organisational behaviour*, Irwin McGraw Hill.

Crum, LW 1971, *Value engineering: the organised search for value* Longman, London.

Department of Defence Australia, 1983 *Value analysis (DRB 37)* Directorate of Departmental Publications, Canberra.

Dell'Isola, A 1997, *Value engineering: practical applications*, R S Means, Kingston, Massachusetts. (1st edition 1974 – published by author)

Eden, C 1995 Theory and Methodology: on evaluating the performance of "wide band" GDSS's *European Journal of Operational Research* **81** 302 – 311.

European Commission, 1993, *Better management through value analysis EUR14394 en*, European Commission DG XIII, Brussels

European Commission, 1995, *Value management handbook EUR 16096 en,* European Commission DG XIII, Luxembourg.

Fallon, C 1971 V*alue analysis,* Wiley-Interscience (Revised Fallon, C 1980 V*alue analysis second revised edition,* Wiley-Interscience, reprinted Miles Value Foundation, Washington.

Fong, PS and Shen, Q 2000, Is the Hong Kong construction industry ready for value management? *International Journal of Project Management* **18** 317 - 326.

Gage, W L 1967, *Value analysis* McGraw Hill, London.

Green, SD 1992, *A SMART methodology for value management* Occasional Paper no. 53 Chartered Institute of Building, Ascot, UK.

Green, SD 1996, *SMART value management: a group decision support methodology for building design* Unpublished PhD Thesis, University of Reading.

Green, SD 1999, A participative research strategy for propagating soft methodologies in value management practice, C*onstruction Management and Economics* **17**, 329 - 340.

H M Treasury Central Unit on Procurement, 1996, *CUP 54 value management* HM Treasury, London.

Hayden, G W and Parsloe, C J 1996, *Value engineering of buildings services: application guide 15/96,* Building Services Research and Information Association, Bracknell, UK

Hellriegel, D, Slocum Jr, J W, and Woodman, RW 2001, *Organisational behaviour* South Western College Publishing.

Institution of Civil Engineers Design and Practice Guides, 1996, *Creating value in engineering*, Thomas Telford Publishing, London.

Janin, L F 1989, Functional specifications or: how to use a new value management technique to succeed in the decade ahead *Proceedings of Society of American Value Engineers Conference*.

Kaufman, J J 1990, *Value engineering for the practitioner* North Carolina State University

Kelly, JR and Male, SP 1988, *A study of value management and quantity surveying practice,* Occasional Paper, Surveyors Publications, London.

Kelly, J, MacPherson, S, and Male, S 1992, *The Briefing Process: A review and critique,* RICS

Kelly, J and Male, S 1993, *Value management in design and construction: the economic management of projects* E and F N Spon, London.

Lui, AMM and Leung, M 2002, Developing a soft value management model *International Journal of Project Management* **20**, 341 - 349

Macedo, MC, Dobrow, PV and O'Rorke JJ, 1978 *Value management for construction* Wiley Interscience, New York.

Male S, Kelly J, Fernie S, Grönqvist M, and Bowles G (1998a) *The value management benchmark: a good practice framework for clients and practitioners*, Thomas Telford, London.

Male S, Kelly J, Fernie S, Grönqvist M, and Bowles G (1998b) *The value management benchmark: research results of an international benchmarking study*, Thomas Telford, London.

Miles, L D 1961, *Techniques of value analysis and engineering* McGraw Hill New York.

Miles, L D 1972, *Techniques for value analysis and engineering second edition* McGraw Hill, New York.

Miles, L D 1989, *Techniques of value analysis and engineering third edition* Miles Value Foundation.

McGeorge, D and Palmer, A1997, *Construction management: new directions* Blackwell Science, Oxford.

Mohd. Mazlan HCM 2002, *Value management: principles and applications*, Prentice Hall, Kuala Lumpar.

Morris, P J W and Hough, G H 1987, *The anatomy of major projects: a study of the reality of project management* Wiley, Chichester, UK.

Mudge, A E 1981, *Value engineering: a systematic approach* J E Pohl Associates, Pittsburgh, Pennsylvania (9th printing 1996)

Norton, B R and McElligott, W C 1995, *Value management in construction: a practical guide* Macmillan, London.

O'Brien, JJ 1976, *Value analysis in design and construction* McGraw Hill.

Park, RJ 1999, *Value engineering: a plan for invention*, St Lucie Press, Florida.

Parker, D E 1985 *Value engineering theory* Miles Value Foundation

Parker, DE 1994, *Management application of value engineering,* Miles Value Foundation

SAVE International, 1998, *Value methodology standard,* (original 1988 revised Oct 1998), Dayton, Ohio, USA.

Shen, Q and Chung, JKH 2002, A group decision support system for value management studies in the construction industry, *International Journal of Project Management* vol **20** 247–252.

Shen, Q, Chung, JKH and Shen HLL, 2004, A group support system for improving value management studies in construction, *Automation in Construction,* vol **13** 209-224.

Shillito, M L and De Marle, D J 1992, *Value: its measurement, design and management* John Wiley and Sons Inc, New York.

Smith, N 2005, *unpublished presentation to the Institute of Value Management Scottish Branch annual conference* 1st September 2005 Glasgow Caledonian University.

Snodgrass, T J and Kasi, M 1986, *Function analysis: the stepping stones to good value* University of Wisconsin

Standing, N 2001, *Value management incentive programme: innovations in delivering value*, Thomas Telford, London.

Szöke, K and Dandri G (1980) Value analysis/engineering in the construction practice *Proceedings of CIB W55 symposium quality and cost in building* Lausanne Sept 1980.

Thiry, M 1997, *Value management practice* PMI Publications Sylva, North Carolina

Venkataramanan, S S 1991, *VE basics in a nutshell third edition,* Venconvave PVT, New Delhi.

Zimmerman, LW and Hart, GD 1982, *Value engineering: a practical approach for owners designers and contractors* Van Nostrum Reinhold.

Chapter 3 The Briefing Process a Review and Critique

3.01 Introduction

The Banwell Report (1964 p3) succinctly summarised the problems associated with briefing at that time in the following statement:

> "many of the difficulties and criticisms of present practices and procedures arise from the fact that those who find it necessary to spend money on construction work seldom spend enough time at the outset on making clear in their own minds exactly what they want or the programme of events required in order to achieve their objective; nor is the importance of spending time in this way sufficiently emphasised by their professional advisers".

The sentiment was repeated thirty years later in the Latham Report (1994 p18) which states "getting the design brief right is crucial to the effective delivery of the project". The same opinion is repeated in more recent government reports. The National Audit Office (2001: p22) states that one of the major barriers to improving construction performance was "poor briefing and definition of requirements with insufficient focus on user needs and the functionality of the construction". The Office of Government Commerce (2003a: p4) citing HM Prison service stated that "HM Prison Service has found that the only way to improve on quality and price was to get the brief right in the first place".

The briefing literature comprises either, papers or research publications describing survey or case study work, or alternatively "how to" textbook or guidance on the application of good practice. The textbook or guidance material either refers to briefing (UK) or architectural programming (USA), the two terms being used synonymously in this chapter. The research studies comprise: the Newman study: Oxford Polytechnic (1981), the Goodacre study: University of Reading (1982), the White study: Florida A and M University (1991), the Barrett study: University of Salford (1999a), the Kamara, Anumba and Evbuomwan study: University of Newcastle and Loughborough University (2001 & 2002), the Brown study (2001) and the Smith study: University of Melbourne (2003). All studies surveyed representatives from design teams and/or client organisations.

The purpose of this chapter is to examine the issues arising from previous research studies and correlate these with points highlighted as good practice in the various guidance publications. The chapter is in five parts reflecting the debates in the literature:

- Client type: - the catalyst for the earliest survey, the Newman study was influenced by work carried out by the RIBA in 1976 resulting in the unpublished report "structure of the profession" which considered the architectural profession in terms of the size and type of practices correlated with client type and project value. Newman investigated whether a particular client type would chose a characteristic type of architectural practice, whether large practices or departments undertook large and complex jobs, and whether such variations, if present, related to certain models of briefing. The survey indicated that small individual clients, unrepresentative of the client body as a whole, commissioned relatively uncomplicated projects which accounted for the majority of work of architects at that time. The public sector provided fewer, high value and more complex projects to fewer, larger private practices.
- Definitions: - the variety in the definitions reflects clearly the standpoint of the author of the definition with regard to; the brief as a document for communication, control and/or as an auditable record, and briefing as a structured or unstructured, proactive or reactive process.
- Structured or unstructured: - the area for the largest debate is whether briefing is a continuous process of random or organised data gathering necessary to react to the design problem currently being addressed or alternatively, whether briefing is a logical, structured process of data gathering in order to build a solution-neutral performance specification of client requirements.
- Briefing guidance – the guidance material is analysed from the perspective of seeking consensus on perceived best practice.
- Conclusion – the conclusion raises issues with regard to the research opportunities in the area of briefing.

3.02 Briefing surveys

The Newman et al (1981) questionnaire survey elicited 208 returns from private practice, 136 returns from local-authorities and 14 returns from universities, statutory authorities and commercial companies. The study period was between February and March 1980.

Mackinder and Marvin (1982) undertook a longitudinal study of 12 (in total) public sector and private sector projects between June 1980 and May 1981.

Edward White (1991) undertook a study of attitudes towards briefing in England in 1986/7. White lists the results of 48 interview sessions with 59 individuals in 40 organisations.

Stephen Brown (2001) undertook a study in 1998 with a questionnaire analysis of an unknown number of clients and 7 case study projects.

Barrett et al (1998a and 1998b) study piloted five case studies with a subsequent main study of 16 case studies in a grounded theory based research project.

Kamara et al (2001) undertook a case study of four projects and tested statements through questionnaire survey of 63 client organisations and 84 consulting firms. Those that responded (11 clients and 14 consultants) reported on 117 projects.

Smith et al (2003) developed an approach to strategic briefing entitled Strategic Needs Analysis (SNA) and tested this through action research involving six case studies.

Based upon breadth and depth the Newman study and the White study are the most comprehensive and also singular in that they draw very few conclusions (although those conclusions that are drawn have not been contradicted). The surveys as a whole are consistent in the reporting of issues and largely consistent in their conclusions notwithstanding that they cover a time period of 20 years.

3.03 Definitions

Briefing is:
"the communication between the client and architect for the purpose of exchanging information and making decisions usually with the purpose of enabling the architect to design a building required by the client" (Newman et al: 1981).

"the process of producing a statement of what the client needs. It is both an expression of project requirements and a learning process. To a large extent briefing activity is integrated with design activity. An important aspect of briefing is its role in facilitating the cultivation of human working relationships during the project and in the overall management of the job." (White: 1991 p8).

"the process running throughout the construction project by which means the client's requirements are progressively captured and translated into effect" (Barrett and Stanley: 1999a pvii).

"the process of gathering, analysing, and synthesising information needed in the building process in order to, inform decision-making and decision implementation. It implies a focus on the project at two levels, strategic and project briefing. Strategic briefing is the identification of the overall mission or goal of the project discovered before the decision of what to build. Project briefing involves gathering facts concerning the building project, comprehending the context within which to design for optimum use and aesthetic expression. Importantly, briefing at both levels requires an understanding of all those aspects of the building and its operations that will make it successful". (Kelly and Duerk: 2001 p38)

Architectural Programming is the research and decision-making process that defines the problem to be solved by design. (Cherry: 1999 p3)

The brief document is:
"a channel of instruction, a means of stimulating discussion, a record of decisions, tool for evaluation, and basis for estimating resources, a contractual document accompanying a legal agreement, a focus for involving all participants and a documentary record". (O'Reilly:1987).

"produced primarily to insure a good fit between buildings and their purposes. They are tools for thinking, communication, and human interaction. Briefs provide an opportunity for clients to clarify their thinking and for architects to understand the client. The brief serves to inform design, to guide project management, and to assure a quality building. The design brief may be used as a yardstick for measuring the success of the new building as an instrument to make the job proceed more efficiently". (White: 1991 p8)

"to define the overall scope of the project in terms of client need to ensure that client aspirations and expectations are met by the project delivery. To provide a record of the mutual requirements against which the completed project can be compared and measured. In addition the brief can be seen as a fixed point against which variations can be recorded". (NHSScotland: 2002).

3.04 Client issues

Newman et al (1981) highlight a number of problems as perceived by architects commenting in the main on small infrequent clients. In the view of the architects surveyed, clients are inexperienced in briefing a building, hold unrealistic expectations in relation to time, tend towards preconceived ideas, do not understand the information required or are unable to articulate needs, can not visualise and tend to frequently change their requirements. Architects also commented upon the client's inability to appreciate those factors which contribute to cost and often require more space than can be afforded. In the context of architects dealing with client organisations problems arise when there is no nominated responsible person, when disputes arise within the client organisation and when access to the end user is denied.

Barrett and Stanley (1999a) describe the process of empowering the client to manage the project dynamics in harmony with the construction industry representatives while involving users appropriately, building appropriate teams and using a clear communication and audit language (in this case visualisation). These aims are to be achieved not so much in the absence of structure but certainly without requiring it. The best practice output sees a briefing process initially with information drawn from the client by knowledgeable advisors with continuous client feedback (through visualisation) through the design process. The brief is not finalised until the design is

complete. This addresses the concerns of Mackinder and Marvin (1982 p10) many years prior who state "the case studies produced some evidence that incomplete briefing and lack of information at an early stage of the design process tended to complicate the design process in the long run, and in some cases be the cause of abortive work". In an example of an office project, abortive design work was blamed on incomplete briefing and client changes leading to the recommendation that architects should be more diligent in seeking proper briefing information and helping clients to be more decisive.

Client feedback through visualisation is mentioned by a number of authors and although Barrett and Stanley (1999a) see this as a computer generated image of a building or a space, Blyth and Worthington (2001), Peña and Parshall (2001) and Hershberger (1999) see visualisation as a wall or panel display of written or sketch material which logically explains the data captured and its processing.

The Newman study acknowledges that the 1980 survey focused mainly on the architect's view of briefing and therefore the resolution of their problems has been considered as central to efficient project development. However, clients in the survey were concerned with many aspects of project development notably; finding sites, obtaining finance, deciding requirements and assessing feasibility. Some clients considered the architect as "a technician who would translate client's requirements into design".

3.05 Client types

Kelly et al (1992) influenced principally by Newman et al (1981) classified client's within a typological framework for the purpose of understanding further the briefing structure most appropriate for a particular client type. This framework is summarised as:

Large Owner/Occupier

Property companies and large organisations building for their own occupation tend to commission design only after completing a detailed identification of need rooted in a strategic plan for the organisation. The development of a project brief (with or without the assistance of the design team), the employment of project managers and the development of in-house design guides are characteristic of this type of client who will

tend to treat the design team as "technicians" necessary for the mechanical development of the design. This group of clients are likely to be innovative in terms of procurement.

Public Sector

The public sector are similar to large owner/occupiers in respect of the approach to project management and the commissioning of design excepting that the driver for the project will be social rather than commercial and be founded on legislative requirements. The public sector operates within a culture of user consultation, public accountability, audit and financial annuality. The commissioning of developments is strictly governed by available finance.

Developer

Developers (as opposed to property companies) are differentiated from large owner/occupiers only in that they are opportunity driven, are dependent upon available sites and require a quantifiable return. The equity holding in the project is released at an early stage often before the end of construction. The type of building will reflect the requirements of the market/location and users are often not consulted before floor plates are fixed.

Refurbishing Retailers

Not included in the original Kelly et al (1992) paper but revealed in subsequent research (Male et al: 2003) as a distinct client type characterised by a detailed identification of need resulting from an intensive study of markets in which the project development forms part of an organisational strategic plan but where opportunity is driven by available new or existing sites. Similar to large owner/occupiers this client group will develop project briefs, employ project managers, develop in-house design guides and treat the design team as "technicians" necessary for the mechanical development of the design. However, dissimilar from the other groups these clients tend to commission large numbers of low value projects, often as little as £50,000, and often employ smaller, local, contractors/consultants. Projects are carried out quickly and often whilst trading.

Small and/or infrequent owner/occupier

This client group tend to re-act rapidly often because existing premises are inadequate for immediate needs. They have limited in-house expertise and therefore rely on design team for briefing. A poor appreciation of the complexities of planning, design and

construction lead to the problems highlighted in the Newman study. Financing is not a characteristic problem but the expectation of what can be bought for the finance available often is. They tend to be directed on a traditional procurement path.

The Brown (2001) survey distinguishes clients (of architects) as:

- User - those who commission works for their own direct use, experienced and inexperienced, public and private sector.
- Developers - defined as those who procure design and construction on behalf of others either on a speculative basis or in conjunction with a specific tenant/ purchaser.
- Design and build contractor.

Green (1996) is critical of these classifications stating that they do not reflect the client as a social system with varying knowledge and attributes. Introducing the work of Morgan (1986) Green contends that an organisational metaphor is a more useful classifier in a consultancy situation such as client briefing. Morgan's eight organisational metaphors are:

- The goal seeking machine running in a predetermined programme set by the owner/director.
- The reactive biological organism capable of continually adapting to its environment.
- The intelligent biological organism capable of predicting changes in its environment and reacting to that prediction.
- The culture dominated organisation in which the values and beliefs of the corporate organisation are of primary importance.
- The political organisation in which power and conflict are dominant and in which groups form and reform based on their political allegiances.
- The psychic prison where the organisation has been overtaken by groupthink and a standard way of thinking predominates
- The transformation organisation indicates an organisation which is continually undergoing change, for good or bad, and therefore a snapshot at a given point in time may not be an accurate reflection of the organisation.
- The dominant organisation where the primary goal of the organisation is to impose organisational will on others.

In his conclusion Green states that clients should be seen as either unitary or pluralistic and that for unitary clients, whose objectives are unambiguous, the machine metaphor is appropriate, however, for pluralistic clients the briefing process must be underpinned by more sophisticated metaphors. Green's conclusion goes little further than Newman who discusses the identity of the "real client" in the context of those within a complex organisation having a legitimate role in briefing with the power to take decisions and accept responsibility. Newman concludes that in multifaceted clients individuals should be identified as having detailed knowledge relevant to design with "the weight of their contribution" made explicit. Distinction should be made between decision makers and information providers recognising that rarely are these the same person.

Although Green is critical of client classification according to that described by Kelly et al (1992) the classification proposed by Green could be considered an overlay and adds to the further understanding of the client organisation although the comments made by Newman might be considered more useful. Apart from Green the client typology has not been challenged and the classification above remains robust. However, in the context of briefing an understanding of client type does little more than sensitise the expectation of the approach to construction likely to be made by clients of a particular type.

3.06 How many stages in the process?

The question is whether briefing is an event, a limited series of events where a logical progression is made at each stage or whether briefing is a multi-stage or continuous process.

Newman et al (1991) state that clients surveyed considered briefing as a multi-stage process where the first part is a minimum statement of the building's function, later supported by room relationship diagrams which describe the concept of the layout with the final stage being fully supporting room data sheets. Room data sheets are consistently referred to by respondents to the Newman survey as the definitive feature of the developed brief. This recognition of two stages is acknowledged by inter alia Kelly & Duerk (2001), CIB (1997), OGC (2003b). Blyth and Worthington (2001) acknowledge 5 types of brief termed; the urban brief, the strategic brief, the project brief, the fit-out brief and the furniture brief, however, the strategic brief and project

brief are the two stages which correlate with other authors. The Kamara et al (2002) survey identified that briefing is a blurred layered process that becomes focused as the design gets progressively fixed. However, at least two stages can be defined spanning RIBA stages A to D: an initial strategic brief which evolves into a more detailed project brief.

Smith et al (2003) assumes that strategic client briefing is now recognised as an essential component of best practice in facilities management as a condition precedent to the development of a strategic needs analysis (SNA) approach to briefing that reflects the organisation's mission, vision and values. SNA is a workshop based approach involving a relevant stakeholder group in a three stage process comprising an information seminar, workshop one to develop options to solve the problem, and workshop two to select and recommend. Smith evolved a key performance indicator measurement tool to measure effectiveness in practice.

Nutt (1993) discusses the role of the strategic brief in a facilities management context stating that the strategic brief should be a record of the organisation's demands for built space, constantly adjusting to reflect; the client issues of business organisation, corporate strategy and objective; the user issues of purpose, efficiency, comfort, safety, wellbeing and environment; the physical issues of space, structure, services, construction and maintenance; the financial issues of capital cost, development value, and costs in use; the contextual issues of site and location; and the operational issues of the post-occupancy management of facilities and their services support. Nutt acknowledges the contribution that space conducive to the organisation's task can make to productivity and quality of the working environment together with the converse but observes that traditional briefing practice is characterised in the search for "purpose" and "intended use" by first use occupiers and the ongoing facilities management dimension is generally ignored.

The views expressed through the surveys and the authors of papers and texts either explicitly support the two stage process or implicitly acknowledge its existence. There is no contrary view of the number of stages although Barrett and Stanley (1999a) see the process as continuously developmental and Kamara et al (2002) identify blurred layers which fall within the two stages. Male et al (1998) and Blyth and Worthington (2001) suggest activities which fall within the two stages.

3.07 Structured or unstructured

Newman et al (1981) reports the survey result that 79.5 % of private practices and 47.8% of local authorities did not use a structured approach to briefing. In a similar question asked by White (1991) 67% of respondents stated that architects do not approach briefing systematically and that the approach tended to vary with the experience of the individual, to the extent that the approach will vary amongst various staff in the same firm. Kamara et al (2002) states that a structured methodology, to analyse and prioritise client requirements, were used in only 28.1% of the surveyed projects and that in 58% of projects no structured briefing procedures were used. Kamara et al (2002) adds that the gathering of information by architects was haphazard such that it was difficult for the client to correlate the investigation with a specific stage in the briefing process in 38.6% of cases. The correlation of results from these studies indicates an absence of a structured approach to briefing in approximately 60% of cases. This figure links satisfactorily with a further report from Kamara et al (2002) who state that a written performance specification is the outcome of briefing in 61.6 per cent of projects surveyed. In 53.6 per cent of projects, sketches and drawings were considered the medium for the translation of client needs into designs. The overlap in these last figures indicates that although some projects had a formal brief the sketches were considered to be the primary briefing outcome

White (1991) supported by Barrett and Stanley (1999a) argue that this misses the point that the briefing process should be as much focused on cultivating a good working relationship with the client, understanding the content of the client's brief, testing the feasibility of the project, and concentrating on management and procedures. White suggests that specific focus should be upon information collection, evaluation and documentation, establishing the building spaces discussing alternative designs, and establishing costs. O'Reilly (1987) believes that in initiating a project it is the client who should present the architect with a clear definition of the project, describing the resources, time, money and skill available and presenting the project in context, explaining those factors constraining the project from inside or outside the client organisation such as any competing client investment plans, statutory or legal matters, technical problems, and if applicable the already chosen site. Client representatives on

the project team should be identified along with the person who will be the main client representative.

In the context of the architect's and client's approach to briefing Barrett and Stanley (1999 p9) state "experience appears to be the major driving force behind brief taking.....experienced brief takers will have developed, over the years, their own set of internalised briefing 'rules' to which they continually refer". Barrett concludes from the result of the case studies that these 'rules' take precedence over design guides and that brief takers have no formal education related to briefing in their training. Brown (2001 p127) is supportive stating that clients and consultants readily admit that experience is the primary basis for briefing. Problems occur where the client is venturing into the unknown and yet the consultants have vast previous experience. While this can be of assistance, the uncovering of the client's true values and requirements, as well as innovative solutions, may be stifled by preconceived solutions. Brown advocates a zero-based approach where structured briefing builds from a solid foundation of no knowledge through to an understanding of time, cost, function and aesthetics together with strategies for energy, environment, user, community and the ongoing facility.

The system of architectural programming as used in USA is discussed by Hershberger (1999 p6) who referring to the UK system of briefing states; "in England, this document is referred to as the 'client's brief'. Aptly-named, these documents are typically very short lists of the required rooms and the square footages, with very little explanation of the values of client, users or society; purposes to be served by the building; relationships between spaces; requirements of the spaces; and so on. This type of programme was adequate at a time when most institutions were relatively simple and slow to change allowing architects to intuitively understand what was needed". The implication is that these systems are not now acceptable.

Barrett and Stanley (1999a p13) in a discussion which argues against too prescriptive an approach states that an organisation that requires a building is, by definition, in a state of change and as the state of change is ongoing this mitigates against an accurate definition of the organisational requirements following the change i.e. as the project develops then so the goals are moving. "The result is observed anarchy". The debate is concluded by observing that innovative techniques encourage the development of new

goals which will cause tension. The whole debate springs from the premise that project goals are continually in flux which might not necessarily be true. This argument sits uneasily with the more structured views of, for example, CIB (1997), Blyth and Worthington (2001) and OGC (2003b) which anticipate the modelling of the client's strategic aims and the support of the model through the business case or Gateway process.

An analysis of the above supports the conclusion that unstructured briefing based upon experience is the norm in the UK but, as stated by Kamara (2002) 60% of UK clients are dissatisfied with the briefing process.

3.08 Structured briefing – architectural programming

Architectural programming in USA is identified as an additional service in the current AIA standard form of agreement between owner and architect (AIA document B 141). From this requirement has evolved a limited number of, generally architectural, firms which specialise in the production of the architectural programme. In a review of the history of architectural programming Cherry (1999) refers to the seminal article in Architectural Record of 1959 written by Caudill and Peña entitled "Architectural Analysis – Prelude to Good Design". William Peña, an early partner in the architectural practice CRSS now part of Hellmuth, Obata & Kassabaum, Inc. (HOK), formalised these ideas into a structured process (Peña and Parshall: 2001). Peña is credited with the development of a structured approach to programming and was widely cited in interviews with architectural programmers during research in USA in 1994. (Kelly and Male: 1995). Hershberger (1999 p7) refers to a later article by Horowitz (1966) which recommends that a brief contains the following information:

1. Objective of the master plan
2. Special restrictions and limitations on design
3. Characteristics of the site
4. Site development requirements
5. Functional requirements for the facility
6. Characteristics of the occupants
7. Specific facility requirements
8. Relative location and inter-relationship of the spaces
9. Budget

10. Flexibility for future growth and changes in function
11. Priority of need among the various requirements

Peña (1987 p18) states that programming and design are quite different, programming is analysis while design is synthesis. Design, conceptual sketches and schematics should not be done during the programming process. A clear statement of the problem is a necessary precursor to design. Fiset (1994) states that the programmer should not also be the designer as these are two different steps by two different people. Further the programmer should stay involved during the design stage to ensure that the requirements of the programme are included in the drawings and interpret the programme to the architect. Goyette (1994) states that programming skills are very different to architectural skills, the role of the programmer is to specify whilst the objective of the architect is, within the given freedoms and constraints, getting the building up.

3.09 Architectural programming - procedures

The procedures for undertaking architectural programming are similarly described by a number of authors (Cherry: 1999, Duerk: 1993, Hershberger: 1999, Kumlin: 1995, Peña et al: 1969, 1977, 1987, 2001), and can be characterised as a logical structured approach the aim of which is to selectively and progressively seek data. Duerk (1993) highlights the dangers of a broad information search strategy resulting in far too much information and Peña et al (1987) quotes the old Spanish proverb "He who grasps too much squeezes little".

The key to the structured approach is an information matrix, in Peña's case comprising four value or issue categories: function, form, economy and time on the side of the matrix with five information areas: goals, facts, concepts, needs and problems across the top. To complete the 20 cells of the matrix programmers commence by independently researching readily available facts through an investigative process. Once this stage is complete, taking approximately 3 weeks, programmers gather as "squatters", usually at the clients' existing facility, for one week to interact with a representative group of client/users with an open invitation for anyone in the client organisation to participate. The agenda for the week comprises 2½ days of interviews and 1½ days of workshop.

During these sessions specific project goals and needs are identified, additional facts generated, problems recorded and where possible solved. The matrix is populated by recording information on five by eight-inch cards and posting these in the appropriate matrix box on a large working wall. Further details relating to space and adjacency are worked out in chalk on a large sheet of brown paper also on a wall. Eventually all the information related to the proposed project surrounds the team.

The information matrix is the key to logically uncovering and recording data. Peña et al (1987) and Parshall (1994) describe the CRSS approach to this stage as five chronological steps:

1. Establish **Goals**
2. Collect and analyse **Facts**
3. Uncover & test **Concepts**
4. Determine **Needs**
5. State the **Problem**

For each step, four types of information are needed and therefore four search areas which make up the whole problem can be identified as.

1. Function
2. Form
3. Economy
4. Time

Within the four search areas there are three prime prompts identified as:

Function

1. People
2. Activities
3. Relationships

Economy

1. Initial budget
2. Operating costs
3. Life Cycle Costs

Form

1. Site
2. Environment
3. Quality

Time

1. Past
2. Present
3. Future

For example in the first step, establish goals, information is required on the function of the proposed project which encompasses, *inter alia*, understanding why the project is being undertaken and its relationship with the corporate mission of the client organisation. Policy decisions on the numbers of people to be accommodated including issues of individuality, hierarchy, privacy, etc., the functional activities to be accommodated in their broadest sense, the required segregation between people and/or activities must all be determined. Form at this stage would relate to issues of policy on siting, internal and external environments and environmental impact, neighbours, and balances of space and quality. Economy relates to budgets, budgetary policy and the balance between capital and annual spend. Time prompts such aspects of tradition, present expectations and anticipated change.

Duerk (1993) outlines an iterative programme under the following headings:

1. **Facts** - trigger the search for the correct identification of the problem, i.e. traffic blockage, hospital waiting lists, customer response times, etc.
2. **Issues** - from the facts issues can be deduced, e.g. circulation, image, comfort, safety, etc.
3. **Values** - the issues are subjected to value criteria determined by the client.
4. **Goals** - the goals are established. The goals should answer the problems and iteration through the above may be necessary to establish that this is the case. The mission statement is a metagoal, a statement concisely expressing the reason a client undertakes a project in the first place. From this come a number of sub-goals.
5. **Performance requirements** - statements relating to the measurable level of function that a designed facility must provide for goals to be met.

Kumlin (1995) follows the same structured approach as Peña et al (1987) and reviews the information matrices of Peña et al (1987), Duerk (1993) and Palmer (1981). Kumlin (1995) emphasises the importance of making explicit issues, objectives and concepts defined as:

- Issue – a statement that contributes to the achievement of the mission statement for the project.
- Objective – addresses a single issue and defines qualitatively or quantitatively the result to be achieved by the final design. There may be more than one objective for each issue.

- Concept – concepts are the means to achieve the objectives and represent the interface between the performance specification and the drawing. There may be many concepts to answer one objective.

Goyette and Thillet (1993) and Goyette (1994) describe the approach of the programmer as being mainly to determine how the future facility will address the client's mission, this being the object of the organisation, its most noble aim and the *raison d'être* behind the work of all its members. The project in hand must achieve a strategic fit with the mission. The client organisational objectives are a subset of the mission, the specific statements which make up the mission and the policies, the statutes and rules of the organisation.

Fiset (1986) and (1994) also emphasises the importance of identifying the goals of the organisation which are expressed as aims. Once these aims are understood measurable objectives can be established. The aims and objectives of the organisation form the strategic plan which is relevant to the identified project and should be recorded for later reference. Organisational aims and objectives are prone to change and it is therefore important at a later stage to understand the context in which the project was undertaken.

Duerk (1993) describes a structured approach through checklists to information sorting and the defining of concepts. The representation of concepts may be through block diagrams, an approach also used by LaPierre (1994) to both illustrate the requirements and to drive a computer based cost model.

3.010 Architectural programming – different forms

Hershberger (1999) categories architectural programming as follows:

- Design-based architectural programming – in USA the most common form of architectural programme is one in which a minimum of information is produced prior to the commencement of design. The programming process is one where the client reacts to the designs produced by the architect and omissions become evident in the drawings. Design, as in the UK, is a process of problem definition and solution by iteration. The communication language is drawing, requiring visualisation which may be inappropriate for the specification of performance. Hershberger states that the method;

minimises time spent formalising the programme; often leads to a positive interaction between client and architect; iterative review may lead the client towards innovative ways to accomplish their objectives; and both client and architect can claim the design solution as their own. However, if the client's briefing is flawed, for example through not fully understanding drawn information, then iterations may become reactionary and adversarial rather than creative. In these situations the process can be time-consuming and costly to all parties.

- Knowledge-based architectural programming - Hershberger identifies the genesis of knowledge-based architectural programming as being at the point when social science research addresses buildings and other designed environments. Issues such as personal space, territoriality, privacy and special needs began to influence architectural interpretation and questioned the knowledge of the architects in the context of the values and needs of people in complex organisations. The advantages of knowledge-based architectural programming are that; it brings to bear all currently available knowledge on the design problem using systematic methods and is especially useful with large, complex or innovative projects where no one person has a clear grasp of the total project requirements. However, the method is time consuming and costly in the absence of a knowledge management system and knowledge database as knowledge will require to be constructed for each project.

- Agreement-based architectural programming – Hershberger (1999 p18) describes this approach as one where the architectural programmer serves the client as a systematic knowledgeable catalyst to guide the nominated building committee within the client organisation in assembling the programme. The most notable example of this approach is that developed by Peña and Parshall (2001) and characterised by the CRS programming matrix described above. The advantage of this approach is in the use of efficient and economical structured techniques to total problem exposition and resolution using a representative group. The visual display of programming information during workshops helps participants to understand and agree the nature and scope of the problem before the commencement of design.

Hershberger states that as a result of this approach costly programming changes during design are generally avoided and the results are typically positive. However, the fixed categories in the matrix (function, form, economy, time) may be too restrictive and important information may be missed. Further, limiting clients and users to specifying by performance is frustrating when they have design ideas that they wish to express. Finally, the programming method is designed to be implemented in the absence of the designer whereas the presence of the designer would ensure full understanding of the client's requirements.

- Value-based architectural programming – Hershberger describes the system for value-based programming as requiring the examination of the fundamental nature of the design problem and the client's strongly held values and goal through interviews and discussion sessions between architect and client. Hershberger recommends a blend of the systematic procedures used in knowledge-based programming with interactive intimacy of the agreement based method. Further, rather than using the CRS categories of function, form, economy and time it should be possible for value areas to change for every project, client and architect.

3.011 Guidance

Guidance on the purpose and method of construction project briefing comprises an eclectic collection of books, articles, official and quasi-official documents and computer software. The guidance varies from the discovery of the strategic mission at the point when a project becomes apparent, to design guides of considerable detail showing for example the layout of furniture in a magistrates court or the layout of shop fittings in a pharmacy. Design guides are excluded from this review.

The guides of pre-1990, MoPBW (1965), NJCC (1973), RIBA (1973), NEDO (1974; 1985), CIOB (1980), CIRIA (1984), and Salisbury (1990), concentrate on the role of the client within a traditional procurement system and in the main are intended to educate clients on the structure of the construction industry and make them more aware of the preparation necessary prior to approaching the industry with a project. Their value in assisting at the very earliest stages of the project is limited. It may also be argued that by

implication they tend to place the architect and the consultant design team in a dominant role, the impression being that the industry has certain fixed procedures to which the client must conform whether or not they seem appropriate.

The general dissatisfaction with traditional procurement caused the British Property Federation to propose their modified version (BPF, 1983). In this system, the dominant role is held by an expert 'client representative' who develops the project brief in consultation with the client body and thereafter to liaise between the client body and the consultant design team as the design is developed.

The guides reviewed by Kelly et al (1992) implied rather than made explicit a two stage briefing process stating that the first, strategic stage required a description of the organisation as a whole, its philosophy of operation and future aspirations prior to relating these to a built solution. At the second stage the strategic brief document is developed into a more detailed design team project brief by a professional advisor in consultation with the client representatives. A conclusion drawn from this observation was that the task and therefore the people involved at each stage would be different and that the stage one strategic brief might be carried out in the absence of the design team since the strategic brief preceded the decision of what to build. This was incorporated into a diagram in Kelly et al (1993).

The guides of post 1990, CIB (1997), Blyth and Worthington (2001) NHSScotland (2002), OGC (2003b) are consistent in their formalisation of the briefing stages referring to the strategic brief and the project brief. The project brief has at least two stages within its development, the first of which is termed the draft project brief or the initial project brief. Blyth and Worthington see the responsibility for the strategic brief as being with the client (project champion) and the project brief with the design team. Other developments commonly incorporated are the references to value management and the value systems of the client. OGC (2003b p7) states "clients must have a clear understanding of their business needs, their wider responsibilities, ...and what the finished facility must deliver. They should also understand what value means in terms of their project.....". Blyth and Worthington (2001 p107) under the heading of managing value state "it is about understanding value .....a way of identifying priorities – those things that are important to the organisation". Finally, whereas the pre-1990 guides presume traditional procurement the post 1990 guides have a general applicability irrespective of procurement system.

3.012 Computer software for briefing guidance

The analysis of computer software is useful in that the development of the software forces the programmer to be very clear regarding the systems in play and the way in which the systems are to be interlinked for interaction, manipulation and reporting.

In the earliest of such research Goodacre et al (1982) asserts that the need exists for a comprehensive guide that takes the client from the initial stages of assessing the need for a building to the details of writing a project brief and selecting a procurement method. The two major problems in producing such a guide were seen as the necessary length, and the fact that it was believed that clients would not be prepared to use a guide which took more than half an hour to read.

The solution to this problem was seen as an interactive computerised guide which, while containing a great deal of information, could respond selectively to specific inputs and queries. The first system, which the Reading University team called the 'Client Guide', takes the operator through relevant pages of text in response to the selection of subject headings from a menu. While this form of 'computerised book' approach was thought to be an improvement, it was still felt that the advice was not sufficiently project specific. The second system, called the 'Client Aid Program', was designed to provide more specific guidance by compiling a project profile by asking the operator a series of questions. Based on this profile, the program then produced a set of guidance notes which were as specific as possible and contained a minimum of extraneous information.

Brandon (1990) reports on the development of an expert system for the strategic planning of construction projects which assists with time and cost forecasting and advises on the selection of the procurement route. It would seem, however, that this system does not deal with the very early decisions highlighted as important by the Reading University team, and while this system could be employed as an aid at the briefing stage, it is not a guide to concept briefing as such.

Kirk (1993; 1994) describes an approach called Strategic Value Planning which relates a client organisation's strategic business plan, mission and goals to three elements, (quality, technology and economic) which are incorporated into a simulation model

termed "VeNTURE". The model receives input from a team who cycle options in a trial and error process. Measures are input for image, flexibility, comfort, environment, capital and revenue costs. The output is a ratio representing value. Once the team is satisfied that optimal value is achieved the software will generate an outline Facility Management Plan for design, construction and operation.

Kamara et al (2001) describe Client-pro computer software as an innovative approach to client requirements processing. The processing starts after the decision to build and uses a Quality Function Deployment (house of quality) approach to produce solution neutral specifications. The advantage of the software lies in the logical input of primary, secondary and tertiary requirements (hierarchical verb noun descriptions) with an indicative weighting and then the logical input of design attributes (e.g. floor area) with a target value. A matrix displays the tertiary requirements against design attributes and seeks a relationship value as in QFD. The output is an appropriate solution neutral specification.

Gelder (2001) surveys a number of other computing models including SEED (a Software Environment to support Early phases in building Design) described by Akin et al (1995), a collaborative project between Carnegie Mellon University and University of Adelaide. SEED allows the speedy generation of computable computer images with data being feed to other linked analytic tools. SEED-Pro is the briefing module of this package which similar to the early work by Goodacre et al (1982) purports to assists the architect in formulating a brief.

Gelder (2001) also reviews Briefmaker developed by Bimal Kumar (Hansen et al: 1996) and Autobrief developed by Mustafa Alshawi (Kelly: 1997). Gelder's review concurs with that of Kamara and Anumba (2001) that these are computerised systems of existing practices.

3.013 Attributes of "good" briefing

Newman et al (1981) records the architects' perception of good practice as including; establishing clearly defined channels of communication; understanding client needs; using checklists, questionnaire and/or data sheets to obtain briefing information (this

information checked through sketch design); keeping written records of all briefing meetings and changes in the brief; explaining fully the building process, the architect's role and fees; and maintaining a firm control of costs from the outset. Architects also highlighted the necessity for the early involvement of all stakeholders and for the final briefing document to be a formal written document agreed by all parties backed up by feasibility, financial and engineering studies to establish its practicability but in a form which allows alternative designs to develop. Architects surveyed expressed a preference to work with a client representative whether specifically appointed for the project or in a senior position in the client organisation. However, architects' perceptions of the role varied.

O'Reilly (1987) considers that a "good brief" will be: explicit regarding its purpose and logical in its flow from the general to the particular; realistic in terms of aims, resources, context and quality; prioritise needs and wants; contain only that information directly relevant to the project; specific enough for decision and action to be taken but flexible enough to encourage innovation.

The White (1991) survey, in answer to a question exploring the critical aspects of successful briefing, reports 60% of respondents cite method, process and management and 30% cite human relations including correct organisational structure and participant commitment. Under the heading of notable ideas resulting from the survey White (1991) highlights the fact that the brief is the first opportunity for the architect to add value to the client's project and that briefing is the preparation for strategic planning decisions. White (1991) records another respondent (p21) "briefs are never innocent. They always contain the value systems of those who provided the information and of those who wrote it down"

Hershberger (1999 p57) also makes specific reference to the importance of identifying and prioritising client values stating "It then becomes relatively easy for the programmer to establish scope of the project, appropriate goals and objectives, specific space needs and mandatory spatial relationships."

3.014 Review and critique

An unexpected characteristic of the literature on briefing is the high level of agreement.

- There is no disparity between any of the survey results. If the Newman study were to be re-run today the evidence is strong that the results would be the same. The issues tested by Kamara where they correlated with the Newman study and the White study demonstrated similar results, often only a few percentage points apart.
- The client type debate which was a primary concern of the Newman study and addressed by Kelly et al (1992) has been cited in other publications with only Green (1996) advancing criticism on appropriateness not accuracy.
- The weight of opinion on whether the brief should be structured or unstructured is heavily on the side of structured. The most advanced form of structured briefing is the architectural programming method advocated by Peña and Parshall (2001) of HOK. This system has been emulated by a number of authors and extensively cited.
- The briefing guidance literature whether as conclusions to the surveys quoted or as discrete texts is in agreement as regards best practice the attributes of which are described above.

The primary question arising from this survey is why when the characteristics of good briefing are known are they not followed. This question can be sub-divided to address particular parts:

- Structures are readily available to apply to pluralistic clients to ensure accurate communication and recording. Whether these structures are based upon investigative or facilitated methods or a mixture of both is not material to the fact that rarely are these structures currently used.
- A logical progression through the process is seen to minimise change. The methods for such a logical progression have been reviewed above and yet change is commonly cited as a significant and characteristic problem in briefing.
- The stages of strategic and project briefing was explicitly described by Kelly et al (1992) and has been advocated subsequently as a preferred approach to projects (not only construction) particularly in guidance CIB (1997). The methods of undertaking such briefing including appropriate responsibilities are described by Male et al (1998) and Blyth and Worthington (2001).

- Strategic briefing particularly in the context of facilities management has been highlighted by researchers as vital to ensure maximum efficiency of planned and existing premises.

However, within all the research and guidance material reviewed very little attention has been paid to the importance of making explicit the client value system. Hershberger (1999) goes some way towards advocating a structured approach to distilling value during the value-based architectural programming method but this does not address fully the absolute values or their prioritisation. The majority of authors reviewed use the term "value" at some point but without a clear definition and without the methods to illicit the value of projects at the time of briefing.

3.015 References

Akin, Ö, Sen, R, Donia, M, Zhang, Y 1995, SEED-PRO: computer-assisted architectural programming in SEED. *Journal of Architectural Engineering* 1995 vol **1(4)** p153-61

Banwell, Sir Harold 1964, *The placing and management of contracts for building and civil engineering work: report of the committee* Ministry of Public Buildings and Works HMSO London

Barrett, P and Stanley, C 1999a, *Better Construction Briefing* Blackwell Science

Barrett, P, Hudson, J and Stanley, C 1999b, Good practice in briefing: the limits of rationality *Automation in Construction* vol **8** p633-642

Bishop, J 1984, 'Briefing - the missing link' in *Designing for Building Utilisation* J A Powell, I Cooper and S Lera (Eds) Spon,

Blyth, A and Worthington, J 2001, *Managing the brief for better design*, Spon.

BPF, 1983 *The manual of the BPF system* British Property Federation, London

Brandon, P S 1990, The development of an expert system for the strategic planning of construction projects, *Construction Management and Economics*, vol **8**

Brown, SA 2001, *Communication in the design process,* Spon, London.

Cherry, E 1999, *Programming for design: from theory to practice*, John Wiley & Sons Inc New York

CIOB, 1980, *Building for industry and commerce: client's guide* CIOB

CIRIA,1984, *Client's guide to traditional contract building Special Publication 29*, CIRIA

Construction Industry Board, 1997, *Briefing the team: working group 1*, Thomas Telford, London.

Duerk, DP 1993, *Architectural Programming: Information management for design*, Van Nostrand Reinhold,.

Fiset, M 1986, Programming and Planning to Cut Capital and Operational Costs, *Proceedings, DC - Maryland - Virginia Hospital Association 45th Annual Conference*, 26 March 1986.

Fiset, M. 1994, *Director, Consulting Group for Organisations inc. in interview*, September 1994.

Gelder, J 2001, *Unpublished briefing position paper* International Construction Information Society (ICIS)

Goodacre, P, Pain, J, Murray, J and Noble, M 1982, *Research in Building Design, Occasional Paper No 7*, University of Reading

Goyette, G and Thillet, C 1993, *Functional & Technical Facilities Programming: A new step in project planning and control*, Practice Paper, June 1993.

Goyette, G 1994, *Principal Partner, Le Group Des Sept, in interview*, September 1994

Green, S D 1996, A metaphorical analysis of client organisations and the briefing process, *Construction Management and Economics* vol **14**, p155-164.

Hansen, KL, MacLeod, IA, McGregor, DR, and Tulloch, IM 1996, Briefmaker: a design briefing tool developed on the internet in Kumar, B editor *Information Processing in Civil and Structural Engineering Design, Scotland:* Civil-Comp Ltd p 69-73.

Hershberger, RG 1999, *Architectural programming and pre design manager* McGraw-Hill

Horowitz ,H 1966, The architect's programme and the behavioural sciences *Architectural Science Review* vol **9(3)** p71-79. (From Hershberger 1999)

Kamara JM, Anumba CJ and Evbuomwan NFO Capturing client requirements in construction projects Thomas Telford 2002

Kamara, JM, Anumba, CJ and Evbuomwan, NFO 2001, Assessing the suitability of current briefing practices in construction within a concurrent engineering framework *International Journal of Project Management* vol**19** p337-351

Kelly G, 1997, Integrating construction software, *Construction Computing* vol **57** p24-5

Kelly, J, MacPherson, S, and Male, S 1992, *The Briefing Process: A review and critique*, RICS

Kelly, J, MacPherson, S, and Male, S 1993, *Value Management - A proposed practice manual for the briefing process* RICS.

Kelly, JR and Male, SP, 1995, Facilities Programming, *Proceedings of Construction and Building Research Conference (COBRA)*, Royal Institution of Chartered Surveyors, Edinburgh, September 1995, Vol 1 99-106.

Kelly, J and Duerk, D 2002, Construction project briefing/architectural programming, in Kelly, J, Morledge, R and Wilkinson, S (eds) *Best value in construction*, Spon.

Kirk, S J 1993, Strategic Value Planning using VeNTURE computer simulation modelling, *Proceedings Society of American Value Engineers Annual Conference*, SAVE

Kirk, S J 1994, *Vice President & Director of Facility Economics*, in interview, September 1994.

Kumlin, RR 1995, *Architectural Programming: creative techniques for design professionals* McGraw-Hill Inc.

Latham, Sir Michael, 1994, *Constructing the team,* HMSO London.

LaPierre, L 1994, *Integrated Information Software for Investment Analysis, in interview*, September 1994.

Mackinder, M and Marvin, H 1982, *Design Decision Making in Architectural Practice*, Research Paper No 19, Institute for Advanced Architectural Studies, University of York

Male, S, Kelly, J, Fernie, S, Gronqvist, M and Bowles, G 1998, *The value management benchmark: a good practice framework for clients and practitioners*, Thomas Telford, London.

Male, S, Kelly, J, Gronqvist, M, Damodaran, L, and Olphert, W 2003, *Supply chain management for refurbishment: lessons from high street retailing* Thomas Telford, London

MoPBW, 1965, *Preparing to Build* HMSO.

Morgan, G 1986, *Images of organisation*, Sage, Beverly Hills. (from Green: 1996)

National Audit Office, 2001, *Modernising Construction*, The Stationery Office, London

NEDO 1974, *Before You Build: What the client needs to know about the construction industry* HMSO, London.

NEDO 1985, *Thinking About Building* HMSO, London.

Newman, R, Jenks, M, Dawson, S and Bacon, V, 1981, *Brief Formulation and the Design of Buildings: a report of a pilot study,* Buildings Research Team, Oxford Polytechnic.

NHSScotland 2002, *Procode Construction Procurement Guidance for NHSScotland Section 1.5 guidance on the development of the project brief,* NHSScotland, P&EFEx, Dec 2002.

NJCC 1973, *Client's Guide: The role of the client in the design of buildings* RIBA Publications.

Nutt, B 1993,The Strategic Brief, *Facilities* Sept 1993 vol**11** (9) p 28 – 33

O'Reilly JJN 1987, *Better Briefing Means Better Buildings*, Building Research Establishment, Garston, Watford.

OGC 2003a, *Achieving excellence in construction – Building on success* OGC, London.

OGC 2003b, *Achieving excellence in construction – Procurement Guide 3, Project procurement lifecycle: the integrated process* OGC, London

Palmer, MA 1981, *The architect's guide to facility programming* AIA press, Washington (from Kumlin)

Parshall, S. 1994, *Senior Vice President & Director of Advance Planning, Hellmuth, Obata & Kassabaum Inc. in interview*, September 1994.

Peña ,W M and Focke, J 1969 *Problem Seeking* Caudill Rowlett Scott, Houston.

Peña, W, Caudill, W and Focke, J 1977, *Problem Seeking: an architectural programming primer* Cahners Books International, Boston.

Peña, W with Parshall, S and Kelly, K 1987, *Problem Seeking: an architectural programming primer*, third edition, AIA press, Washington.

Peña, W and Parshall, S 2001, *Problem Seeking: an architectural programming primer*, fourth edition, John Wiley and Sons Inc .

Perkinson, GM, Sanvido, VE, Grobier, F 1994, A facility programming information framework. *Engineering Construction and Architectural Management* vol **1** p69-84

RIBA 1973, *Plan of Work for Design Team Operations* RIBA Publications.

Salisbury, F 1990, *Architect's handbook for client briefing* Butterworth Architecture Management Guides.

Smith, J, Wyatt, R and Jackson, N 2003, A method for strategic client briefing, *Facilities*, vol **21** no.10 203 – 211.

White, ET 1991, *Design Briefing in England* Florida A and M University, Architectural Media Ltd Tucson

Chapter 4 Synthesis, the Research Proposition and Research Methods

4.01 Introduction

This chapter reviews and synthesises the conclusions of chapters two and three to expose a valid research proposition following which a review of research methods is undertaken to determine the structure of a research methodology conducive to the investigation of the research proposition.

4.02 Review of value management

In concluding chapter 2 the characteristics of value management were summarised as being:

- project focused
- team based
- led by a knowledgeable practitioner or facilitator
- involving the use of structured procedures and techniques
- its application at a number of points in the process
- function orientated
- based upon understanding what is of value to the client.

The areas where there is consensus and where literature from non value management sources concurs is in the areas of teams, facilitation and those procedures or techniques, for example brainstorming, which are not the sole preserve of value management. Value management texts describe function analysis and the job plan in similar terms. Where the core value management texts are silent or do not concur is in the areas of project focus; the application points in the context of construction and the understanding of the client value system. It is the transfer of the corporate value system to the project value system at the interface of the corporate mission and the project which remains problematic.

A review of the value management literature highlights a number of goals and matching management and technical systems. These are diagrammatically represented in figure 4.1. An examination of the goals and systems in place reveals for example that the goal

of a structured approach is supported by the systems in place of a facilitated workshop and the job plan. The goal of being innovative is supported by the systems of

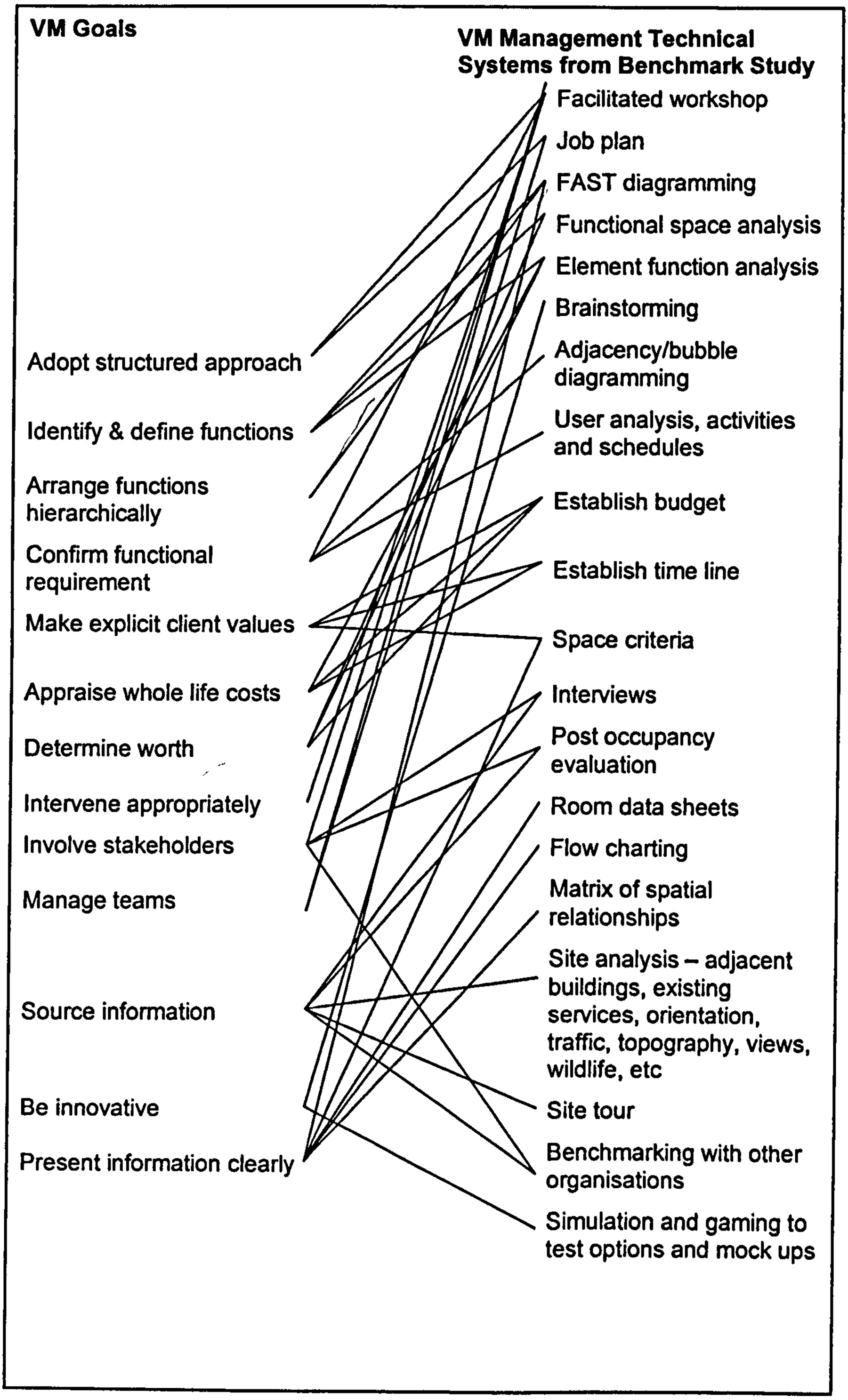


Figure 4.1 Value management goal and systems model

brainstorming, simulation and gaming. These goals are supported by a system which is well configured to support the goal. However, the goal of making explicit client values is correlated only with the systems of budgeting, time line and space criteria. It is argued here that these systems will not lead to an adequate statement of the client's values. If the goal is to form an explicit statement of client values then, from a value management context, the systems have to be in place to undertake the task. Further it is a failing of value management if the value criteria for a project at strategic briefing stage are not made clear.

4.03 Review of briefing

Chapter three concludes that the majority of briefing in the UK consists of an unstructured, investigative, continuous process involving dialogue between the client representatives and the brief taker (usually the architect or project manager). However, the weight of opinion from the various academic surveys undertaken on whether the brief should be structured or unstructured is heavily on the side of structured. There was sufficient weight of evidence to conclude that a logical progression through the briefing process is seen to minimise change. The final conclusion relevant to this debate is that the stages of strategic briefing and project briefing have been adopted by guidance documents and recommended as best practice. A summary of the goals of briefing, extracted from the literature, are shown alongside the various briefing management and technical systems described in the literature. Similar to value management the best correlation between the goal of making explicit client values and the systems described in the briefing literature is between time, cost and space criteria. Also posed by the literature but without solution is the method of deriving the project mission and learning and managing knowledge. Also similar to value management some goals have a set of highly appropriate systems whereas others are less well provided. Relevant to this research is the absence of inclusive, adequate systems in briefing to express the client value system at the strategic briefing stage.

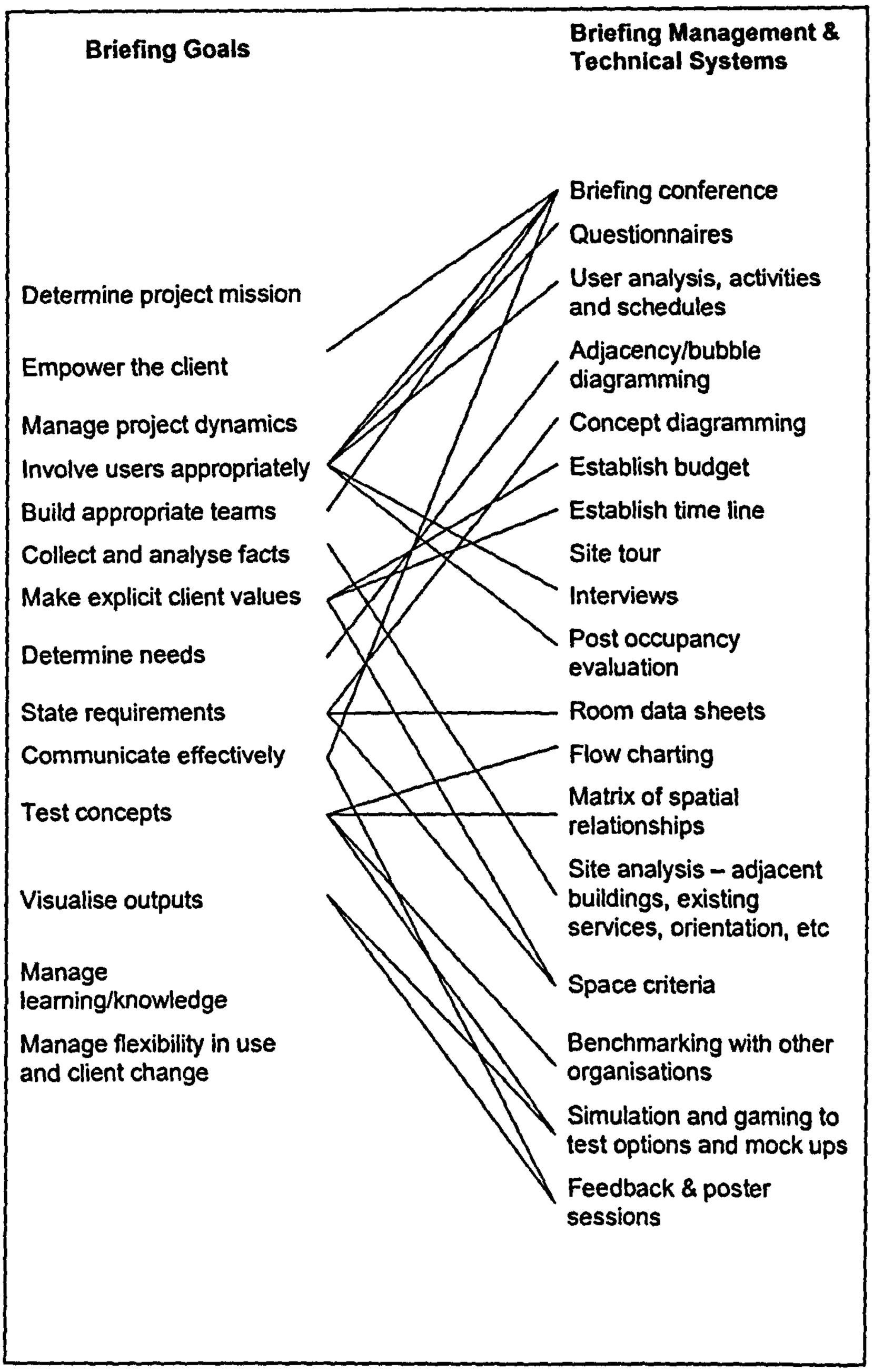


Figure 4.2 Briefing goal and systems model

4.04 Synthesis and research proposition

A study of value management reveals a service which is project focused, functionally orientated, team based, led by a knowledgeable practitioner or facilitator and involving the use of recognised techniques for acquiring knowledge and determining function. The literature is consistent in the description of teams, team dynamics, team management and facilitation. The job plan evolved by Miles (1961) is replicated, reasonably consistently, in subsequent texts and papers. Those texts that define value, define it as a relationship between function and cost and/or worth. These definitions are expressed in inexact terms and are not incorporated in any techniques for the representation of the client value system. This gives rise to an *a priori* research proposition:

It is practical to develop a framework for the explicit exposition of the client value system for use in a value management workshop at the strategic briefing stage of construction projects

Studies of briefing reveal a project focused service with the primary aim of facilitating efficient communication between the client and the architect. Surveys have revealed that the majority of briefing is unstructured, but where it is structured the aim is to produce a document defined as a channel of instruction, a means of stimulating discussion, a record of decisions, a tool for evaluation and a basis for estimating resources. There are differences of opinion over what constitutes a briefing procedure ranging from a distinctive event to a continuous process which is complete when the design is complete.

The system of Architectural Programming, mostly undertaken in the USA, envisages an event or series of events the output from which is a document. Recent literature highlights the difference between the strategic brief and the project brief. Apart from Hershberger (1999) very little attention is paid to the values of the client being made explicit within the briefing process. This gives rise to a supplementary research proposition that if it is practical to develop a technique for the explicit exposition of the client value system for use in a value management workshop then:

4.05 The nature of the research problem

Buckley et al (1976 p15) see the genesis of research problems in general in circumstances of either problem solving or problem finding. In a problem solving situation the hypothesis or research question is self evident. Problem finding is the seeking of advancement in knowledge and/or performance through the questioning of existing structures. This questioning is prompted by formal and informal approaches to the subject under review. The formal approaches are classified as:

- analogue: uses knowledge gained in one subject area to question a related area.
- renovation: uses a systems analysis approach to identify defective or valueless components.
- dialectic: uses logical disputation, commonly through the analysis of advantages and disadvantages, to support the continued existence of a process in its current form.
- extrapolation: extends current processes into an uncertain future to test against optional scenarios.
- morphology: analyses the combination of possibilities inherent in complex problems. It ensures that the total number of possibilities are realised before selecting a particular course of action.
- decomposition: involves the breaking down of a problem into its component parts.
- aggregation: takes existing theories from discrete areas and combines them to form composite theories for exposing complex problems.

The informal approaches are classified as:

- conjecture: relies on the intuition of the researcher to identify a possible problem.
- eventuation: is the identification of a problem caused by the development of technology or social attitude e.g. computing, health and safety, etc.

- consensus: problems raised by a task group, quality systems, etc.
- experiential: a problem experienced, commonly as a threat to the business.

Having understood the genesis of the problem Buckley et al (1976 p19) propose that the research problem is correctly and precisely defined; is posed in solvable terms, is connected logically to its environment, has been screened against existing knowledge to ensure its uniqueness and is significant in terms of its potential contribution.

In the context of the research propositions in 4.04, it was originally proposed to use knowledge gained in value management to question the client value system in the context of briefing, specifically at the stage of compiling the strategic brief. The value management knowledge reflected in texts and papers is insufficient to formulate an algorithm for value which might be used as a workshop technique inferring initially that the research structure may include renovation and yet is more likely to be influenced by theories within the subject of value leading to the conclusion that the research is aggregation.

4.06 A consideration of research methodology

The solution of the research problem has been debated since the time of Aristotle, particularly whether the researcher chooses a research method based on the approach to the problem or whether the identification of the problem demands a consequent research approach. The terms; phenomenology, inductive, deductive, positivist, constructivist, structuralism, metaphysics and ontology, are described as a prelude to a discussion of the approach to the research problem.

- Ethnography is the observation and description of the social life, behaviour, beliefs and values of a community by a researcher who temporarily joins the community. Fellows and Lui (1997 p15) state that the degree of influence caused by the researchers is extremely difficult to determine.

- Phenomenology is the observation or description of any event that can be explained in precise terms. Complex phenomena will require breaking down into their component parts until it can be precisely defined. Audi (1995 p664) describes

phenomenology as "....a clearly delineated body of doctrines whose essential characteristics can be expressed as a set of well chosen statements."

- Inductive research is the formulation of a generalisation from a number of observations or instances.

- Deduction is defined as a series of logical statements where the last is the conclusion of the sequence. Each statement in the sequence must be an axiom (in this context an established principle or fact) and the final sentence is a theorem or logical deduction. The inductive-deductive cycle is illustrated in figure 4.3.

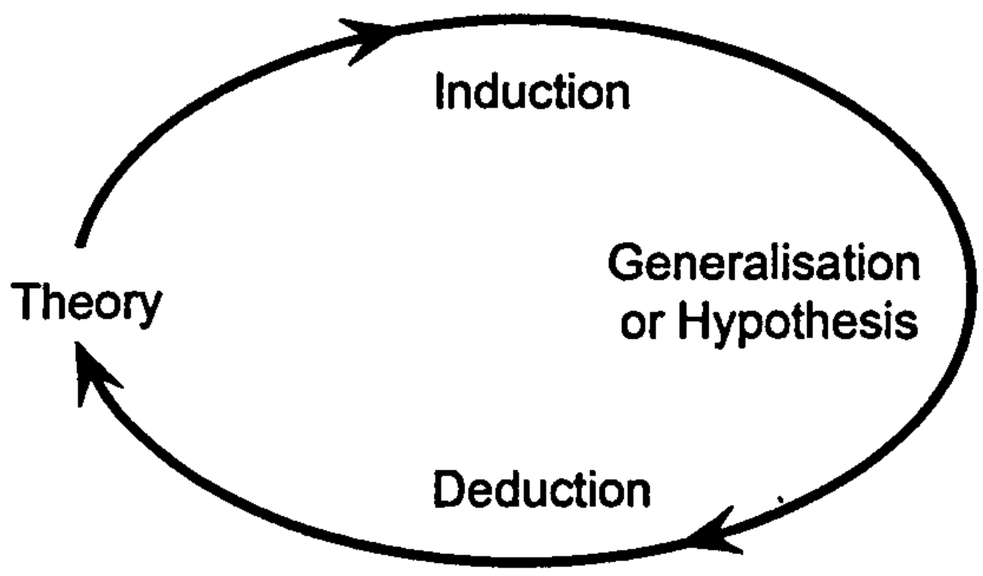


Figure 4.3 – Induction/Deduction cycle

- Positivism is the situation in which the researcher stands apart from the research problem facilitating its solution through the use of established objective measures uninfluenced by the researcher. Nothing is inferred. Easterby-Smith, et al (2002 p28) state that the researcher must be truly independent of what is being observed, and the choice of what to study and how to study is determined by criteria rather than by human beliefs and interests. The French philosopher August Comte is quoted, "all good intellects have repeated, since Bacon's time, that there can be no real knowledge but that which is based on observed facts". .

- Structuralism proposes a "scientific" model of language composed of a closed system of words, sounds, drawings, etc and rules which attempt to precisely represent fact by negating ambiguity (Audi, 1995). The concept of structuralism is

not widely debated in research methods texts and for the purposes of this thesis can be seen to be analogous to positivism.

- Social constructivism, also called social constructionism, assumes (Audi,1995 p855) that the world and our knowledge of it is interpreted through social practices and institutions. Therefore research results will necessarily be filtered by their relevance within a particular social context i.e. it is not just a matter of measuring but also understanding the constructs that people place on their experience of the subject under interrogation. Easterby-Smith, et al (2002) see social constructivism as being at the opposite end of a continuum to positivism.

- Metaphysics is the philosophical investigation of the nature, constitution and structure of reality and is broader in scope than factual science. The term dates from an early editor of Aristotle who collected works following the scientific work under the heading of "after physics" or metaphysics. Positivists generally reject the concept on the basis that logical statements are not factually verifiable.

- Ontology is a subset of metaphysics that recognises that any concept is comprised of entities that have identifiable, characteristic relationships with other entities. An entity in this context is self contained, definable and possesses particular properties.

These definitions are useful in clarifying that the proposed research is ontological and likely to use inductive and deductive research. However, more important is the question posed for debate at the head of this section of whether the researcher makes the choice of research method based on their approach to the problem or whether the problem itself demands a particular research approach. There are two basic approaches to the research problem being either phenomenological/inductive i.e. working in the area of the discovery of generalisations from observation of phenomena; or deductive i.e. developing existing research through combination, integration and logical deduction to form new theory which is then tested against facts. Easterby-Smith, et al (2002 p57) see the approach to the research problem as being dependent on the researcher's attitude to positivism and social constructivism and the desire to be involved or detached from the investigation. These issues are seen as fundamental in the choice of a research design illustrated in Figure 4.4. Gill and Johnson (2002 p29) agree stating that observation is "theory laden" raising the problem that there is no independent or neutral point for the

researcher to observe the world and thus all knowledge is from a particular viewpoint or paradigm. This view is also endorsed by Ottosson (2003) who states that the basic paradigm in classical research emanates from Sir Isaac Newton and his classical mechanics presented in 1672 in which the accepted protocol for research was that the researcher should influence neither the research object nor the research environment. However, it is concluded that the researcher always influences the studied objective through the tools used. Logically therefore the research approach is always the choice of the researcher.

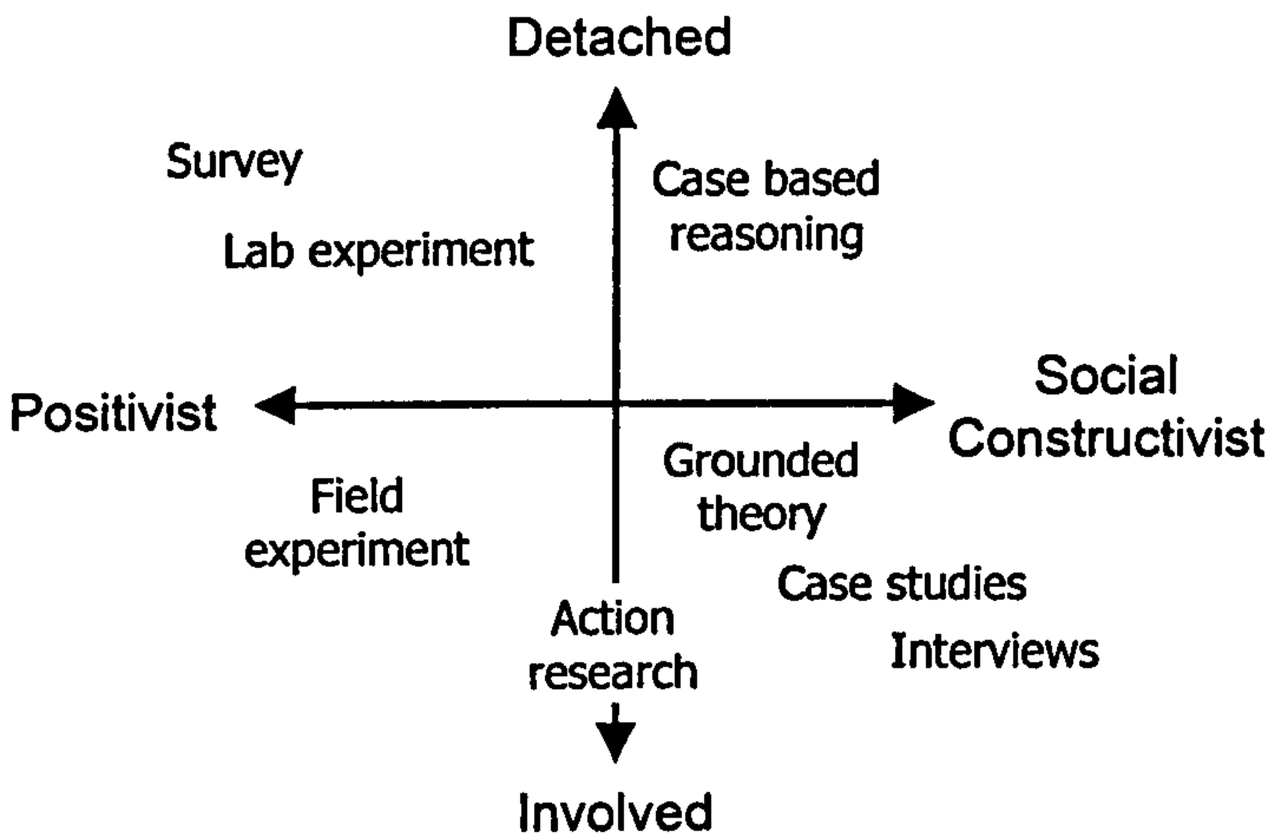


Figure 4.4 – Research methods are driven by approach (adapted from Easterby-Smith, Thorpe and Lowe (2002 p57))

Based upon a development of the theories of Buckley et al (1976 p23-27) it can also be argued that the choice of research methods reflects the extent to which the researcher wishes to remain in precise control of the developing research. An analogy is the question whether the researcher wishes to drive the project on rails or is the researcher willing to drive on ice. Research methods can be divided into the four categories of empirical methods, database methods, opinion survey or logical deduction. The relationship of the various research methods between the four categories and the amount of control is illustrated in Figure 4.5.

The contention (Buckley et al: 1976) is that the specific method is largely the choice of the researcher and will be influenced by the researcher's positivist or social constructivist approach, whether there is a desire to be detached or involved and

whether the researcher wishes to maintain a high degree of control over the research programme.

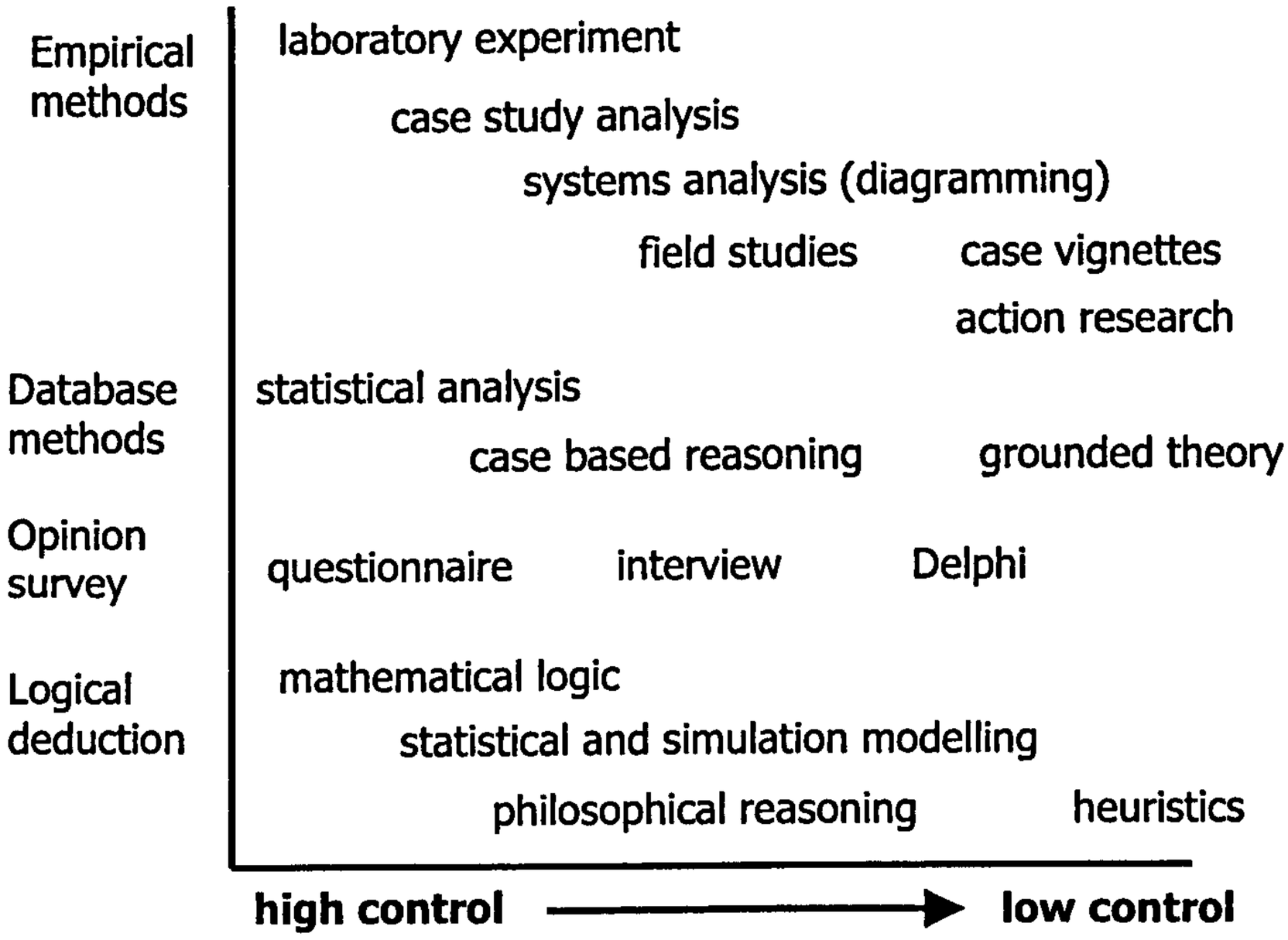


Figure 4.5 – Control characteristic of research methods

4.07 Nature of the client value system problem

In the selection of an appropriate research methodology it is necessary to determine the nature of the "client value system" problem, summarised as:

- A term in usage commonly in medical/counselling literature referring to the "patient" and also in construction literature referring to the "employer".
- The term is used although not defined beyond those generalised personal or corporate attributes that define, for example, culture, strategy, attitude and actions.
- There is no theory directly attributable to the client value system although there is theoretical work surrounding the concept of value.
- There are no published case studies of a value equation in use.

- There is a very small constituency of organisations exposed to the structured exposition of the client value system, usually as a collaborator to an academic research project.

In the context of the nature of the problem, figure 4.6 summarises the debate preceding the adoption of a research methodology appropriate to investigate the veracity of the research propositions in section 4.04.

Research Method	Brief Description	Applicability to Research Proposition
Laboratory experiment	Research undertaken in a place equipped for undertaking experiments in a controlled environment. Research predominantly following a hypothetico-deductive strategy. High confidence of repeatability.	It is theoretically possible to undertake a laboratory experiment but in reality logistically impossible due to the geographic spread of people and projects. Consider further – no.
Case Study Analysis	A representative sample of instances studied to obtain data for analysis to prove a theory. Data may be derived from document analysis, measurement, observation and/or interview. More a means of obtaining data than a research method. (Fellows and Lui: 1997)	Case studies of completed value engineering or value management workshops are an attractive source of data, however, a review of a sample of workshop reports show that the client value system is not explicitly derived. Consider further – no.
Systems Analysis (diagramming)	The use of process mapping to explicitly portray a systematic procedure. IDEF0, derived from the US Air Force ICAM project, is an example of a systematic and repeatable method for representing a large number of actions within a single procedure e.g. the lease, refurbishment and operation of a retail unit. (Hunt: 1996)	The client value system is a framework not a longitudinal sequence of steps. Consider further – no.
Field Studies	A descriptive or analytical survey carried out in the field, commonly by questionnaire recording attitude to a factor.	The research proposition is not seeking a relationship between categories of client's and value criteria

	The respondent is the "independent variable" and the response the "dependent variable". Respondents are categorised and normally the category and the response statistically analysed for a measurable relationship. (Naoum:1998)	but seeking a way of making the value criteria explicit. Consider further – no.
Case Vignettes	A case vignette is a concise description of a situation to elicit an expert response from a participant or a focus group. It is a way of realistically portraying an example and asking the question "what would you do in this situation?"	It is feasible to prepare case vignettes of various hypothetical construction projects and elicit from client representatives value criteria. Consider further - yes
Action Research	In the above methods the researcher acts as a recorder or data gatherer and does not interfere with the studied activity. In action research the researcher proposes methodology and interacts with the studied activity to apply the methodology and record results. (Naoum: 1998)	The proposition of a methodology for the client value system and its trial in a live project situation is a feasible approach to the research proposition. Consider further - yes
Statistical Analysis	Inferential statistical analysis is applied to data gathered as a part of the research or from existing databases, e.g. BCIS cost analyses. The objective is to infer a relationship between data sets in order to prove or disprove a hypothesis. (Naoum: 1998)	The research proposition arises from study which confirms that the client value system is not currently made explicit. There is no available public domain data set which relates to client value. Consider further – no.
Case Based Reasoning	Case based reasoning relies on a library of past cases with a brief description of the problem and its solution. A new research problem is matched against cases in the database to identify an identical or near equivalent situation. The solution from the database is used as a basis for deriving an answer to the research question. An example database is Triz.	The research proposition arises from study which confirms that the client value system is not currently made explicit. There is no available public domain case set which relates to client value. Consider further – no.

Grounded Theory	Grounded theory is an approach to the analysis of data within a database which seeks to discover theory which is founded in the data examined. A structured analysis of sufficient data ensures that the theory is validated at a suitable level of statistical significance. Researcher bias has to be acknowledged. (Fellows and Lui: 1997)	Grounded theory is a possible approach to discovery of a client value system which would be reliant on a number of longitudinal studies, a large questionnaire or interview survey and the analysis of the data. Consider further - yes
Questionnaire	A method of eliciting a large quantity of fact, knowledge and/or opinion from a selected sample of respondents. Normally a means of collecting data to be subsequently statistically analysed. The questions posed must be unambiguous and capable of only one interpretation.	The fact that the client value system appears difficult to make explicit militates against the use of questionnaire survey to elicit client values. Consider further - no
Interviews	A method of eliciting a measured quantity of fact, knowledge and/or opinion from a selected sample of respondents. Normally a means of collecting data for subsequent analysis. The interview may be structured or unstructured with the former comprising open or closed questions. The advantage of interview over questionnaire lies in the opportunity for clarification.	The interview is a valid method of collecting data for determining client values. Consider further - yes
Delphi	A technique developed by the RAND Corporation to elicit expert opinion from questionnaires. The technique is iterative and seeks to establish a consensus viewpoint against which a strategy can be developed. A focus group may be employed following a round of questionnaire survey. (Langford and Male: 2001).	Delphi is a refinement of the questionnaire and is a valid method of collecting data for determining client values. Consider further - yes
Mathematical Logic	The development of theorems which can be proved logically when certain facts are assumed.	The development of a logically derived algorithm in which the variables are

	Once developed they are easily repeatable.	given values is an attractive means of developing an explicit representation of a client value system. Consider further – yes.
Statistical and Simulation Modelling	Modelling is the dynamic representation of reality, either as a system or a process, which can be manipulated in order to predict an outcome. Given constant inputs the model will produce a constant outcome.	A statistical model of the client value system would be impossible to construct due to the lack of data as described above. A simulation model of a client value system is a possible approach. Consider further – no.
Philosophical Reasoning	Similar to mathematical logic philosophical reasoning depends upon a logical explanation which is repeatable given the assumption of certain facts.	Philosophical reasoning is a fundamental part of this thesis.
Heuristics	A development of simulation modelling but based upon rules of thumb rather than fixed variables. Allows uncertain futures to be modelled within a range of certainties.	A heuristics approach to the simulation modelling of client values is an attractive approach once the variables of the client value system have been determined. Consider further – no.

Figure 4.6 Prospective research methods

The above analysis indicates six possible courses of research action using:

- Case vignettes
- Action research
- Grounded theory
- Interviews
- Delphi
- Mathematical logic

Prior to the adoption of a particular method it is necessary to consider the nature of the client value system theory being developed.

4.08 Measurement scales

Before discussing theory building it is necessary to rehearse the scales by which a client value system might be measured. There are four scales for measuring data termed nominal, ordinal, interval and ratio scales which have the following characteristics.

- **Nominal scale** is an integer scale based upon counting the number of occurrences of an event. For example the number of males in a population sample or the number of times "6" occurs on the throw of a dice. The numbers are pure integers and can be statistically processed or otherwise manipulated.

- **Ordinal Scale** is a ranking scale where the number indicates a position in a series or where the number is a surrogate for descriptive criteria. An example of the former is a class of children lined up according to height, shortest to the right, and numbered in sequence. The number given to each child indicates position in the sequence according to height but does not reflect the actual difference in height i.e. the interval between numbers is not constant. Situations where the number is a surrogate for descriptive criteria arise in surveys where, for example, a "5" is excellent and "1" is poor. The interval relates to position and is not mathematically significant. While statistical processing is relatively straightforward on an ordinal scale care has to be taken in other mathematical processing particularly in the context of multiplication in a weighting process.

- **Interval Scale** is one in which the interval between numbers is exactly the same but where there is no natural zero. The most quoted example is temperature (indeed it is difficult to think of another example). The interval between each degree is the same anywhere on the scale but is meaningless to state that a rise in temperature from 15° to 30° means that it is now twice as hot as it was.

- **Ratio Scale** is an interval scale with a natural zero. Measurements of weight, length, area, volume, voltage, time, etc, can be taken and the results multiplied and divided. The notion that something is twice as heavy as

something else, 2 hours is twice as long as one hour, or that 6m is twice as long as 3m is meaningful. Logarithmic scales e.g. decibels obey the same rules. The term interval scale is often used in the situation where there is a natural zero and is used in this manner in this thesis. The term ratio scale is not used.

4.09 Theory building

A theory is a supposition or system of ideas explaining something especially based on general principles independent of the facts, phenomena, etc (OED)

Gill and Johnson (2002 p31) state that the terms "theory" and "hypothesis" are often used interchangeably but should be viewed as working together to conceptualise and explain a particular social or natural phenomenon. In deductive research a number of related hypotheses sharing one or more common properties, may combine to form a theory for testing whereas in inductive research the investigation of phenomena will generate theory. (Gill and Johnson, 2002 p34).

Fellows and Lui (1997 p56) state it is the body of theory that determines the theoretical base for the research, describing theory as providing the frame for the research "like a structural steel or reinforced concrete frame is used in a building".

Naoum (1998 p39&42) states that in quantitative study, hypotheses, research questions and objectives can be better understood when they are grounded in a theoretical framework which is stated explicitly at the commencement of the research project. In contrast in qualitative research the situation is less clear as the theory may emerge at any point during the data collection and analysis phase. Theories derived in qualitative research should be compared with other theories to determine whether they reinforce or supersede. Creswell (1998 p84) broadly supports this view indicating that the theory used depends upon the approach to the study. If the study is ethnographic or phenomenological then theories need to be established early in the development stage. If the study is biographical or case study based then theories can be developed at a later stage during the research and finally if a grounded theory approach is adopted then theory will be developed from the data.

Easterby-Smith, et al (2002 p46) debate whether the theory or the data comes first describing the Glaser and Strauss work in grounded theory in 1967 and their subsequent difference of opinion. Yin (1994 p28) provides the conclusion, stating that the goal of initial theory building is to have a sufficient blueprint for the study and that theory development prior to the collection of any case study data is an essential step.

Wacker (1998) states that in the context of research, theory provides; the framework for analysis, an efficient method for field development and clear explanations for the pragmatic world. Quoting Van de Ven (1989) Wacker states "good theory is practical precisely because it advances knowledge in a scientific discipline, guides research towards crucial questions, and enlightens the profession of management."

Wacker (1998) addresses the definition and nature of theory stating that theory should have four basic criteria:

- Conceptual definitions - The role of the literature search is a fundamental stage of theory building as it provides accepted theory. This gives the context and the current state of research in a given area. In research endeavours to build new theory it must be recognised that new theory cannot just confirm existing theory, it must either supersede or negate it (known as the conservation rule).
- Domain limitations – The aim is to generalise the theory such that it will apply to the widest possible domain. Domain limitations are considered unhelpful. Applying existing theories to new broader areas, testing the theories in new environments or at different time periods broadens the domain.
- Relationships – There are four types of theory building relationships; with fundamental laws, theories derived from fundamental laws, theories that span between the theoretical and empirical world, and current research hypotheses. The importance of new research is proportional to the care taken to relate new research to existing laws and theories.
- Predictions – Whilst it is only necessary for a theory to be logically intact and predicted to be so, for it to be sound, many researchers seek to prove that the theory has empirical application in a pragmatic world.

- Theory builders should observe the following supplementary criteria. (Wacker, 1998)
- Uniqueness: means that one theory must be differentiated from another.
- Conservatism: a current theory can only be replaced by a new theory if it is superior in important aspects.
- Generalisability: the more areas that a theory can be applied to makes the theory more important.
- Productive: a good theory is one that is fertile in generating new models and hypotheses.
- Parsimony: the fewer assumptions the better.
- Internal consistency: the theory gives adequate explanation for all relationships.
- Empirical risk: the theory should hold itself up for refutation and not hide behind limiting caveats.
- Abstraction: the theory should be independent of time and location.

4.010 Synthesis - the five levels of theory

Wacker's relationships (1998) give a useful indicator of the following proposed five levels of theory:

Level 0 – Fundamental Laws. Buckley, et al (1976, p29) state that laws are verified hypotheses used to assert a predictable association among variables. Laws may be soft, for example the economic laws of supply and demand, or hard, for example Boyle's Law.

Level 1 – Conceptual framework: operates at the level of concept or idea and includes issues of philosophy, logic, or natural occurrence. However, interpretation can be influenced by culture, perspectives and existing paradigms. Concepts are related to fundamental laws and fall into two distinct categories:

- those which can be judged by physical laws and are measured usually with a physical tool for which only one sense is required to interpret. Examples of conceptual frameworks at this level are speed, force, stress, pressure, torque, etc. The measurement is on an interval scale in respect of their weight/mass;

dimension/volume/capacity; time, temperature; light emitting/conductance, sound emitting/conductance, magnetism and electricity.

- those which are measured on a notional scale possibly requiring more than one sense for their interpretation. Examples of conceptual frameworks at this level are value, quality, aesthetic, ethics, etc. The scale will be ordinal and relates to safety, security, goodness, compassion, excitement, comfort, etc.

Buckley, et al (1976 p29) support this interpretation of a conceptual framework stating that concepts and constructs are designed to form logical and systematic relationships among data. Rigby (1965 p15) states "concepts are inventions of the human mind to provide a means for organising and understanding observations. They are not discoveries... We may discover items in the environment to which we attach concepts, but we do not perceive concepts. We invent them."

Level 2 – Theoretical framework: operates at the level of derived theory either deductive being a theorem derived from existing theory or inductive when derived from grounded theory. A theoretical framework is a specific combination of concepts to form a theoretical construct. The theoretical construct recognises and makes explicit context, behaviour, perspectives and paradigms. Examples at this level include team dynamics, motivation, procurement, incentivisation, facilitation, etc. A theoretical framework, logically validated, does not have to be proved to exist but new theory at the framework level should comply with Wacker's criteria (1998).

Level 3 – Technical framework: is the explicit empirical application of one or more theoretical frameworks. A technical framework has a well understood service outcome and is generally defined in terms of its processes or tools. Technical frameworks in the context of theory include all branches of engineering and researched aspects of management for example risk management, value management, project management, cost control, benchmarking, total quality management, etc.

Level 4 – Practical framework: can arise either by the practical development of a technical framework such that it becomes operational or as a pragmatic development based upon practical usage, which is found to work. In the later case practical frameworks are not developed from previous theories nor are they developed in an academically robust way using validated research strategies e.g. a construction

performance indicator developed pragmatically, introduced and found to work. For a practical framework to become a technical framework it must first be validated in terms of its component theoretical frameworks.

The research methods strategy diagram figure 4.7 summarises possible research paths through the five levels. Possible routes are:

- Purely deductive taking existing theoretical concepts from the conceptual framework level literature and developing a new potential or embryonic theory. Although Wacker (1998) indicates that the new theoretical framework and/or new theory could lie unproven it is logical for the new framework to be validated by developing hypotheses and/or research questions, undertaking deductive research to validate or falsify the theory, rebounding at levels 2, 3 or 4 into a validated new theoretical framework of new or existing theoretical concepts.
- Deductive taking an existing theoretical framework, for example, from another scientific, social, commercial or industrial context and developing a new theoretical framework. The new framework will be tested at a practical or technical level.
- Inductive research makes an observation from the pragmatic world either at levels 3 or 4. Grounded theory and/or structured literature review builds a new theoretical framework, comprised of new or existing theory. Any new theory proposed at this point must take cognisance of existing theories and obey Wacker's criteria principally that of conservatism.

The research methods strategy diagram also indicates the notion of theory bounce where new theories and/or theoretical frameworks are formed as a result of the research.

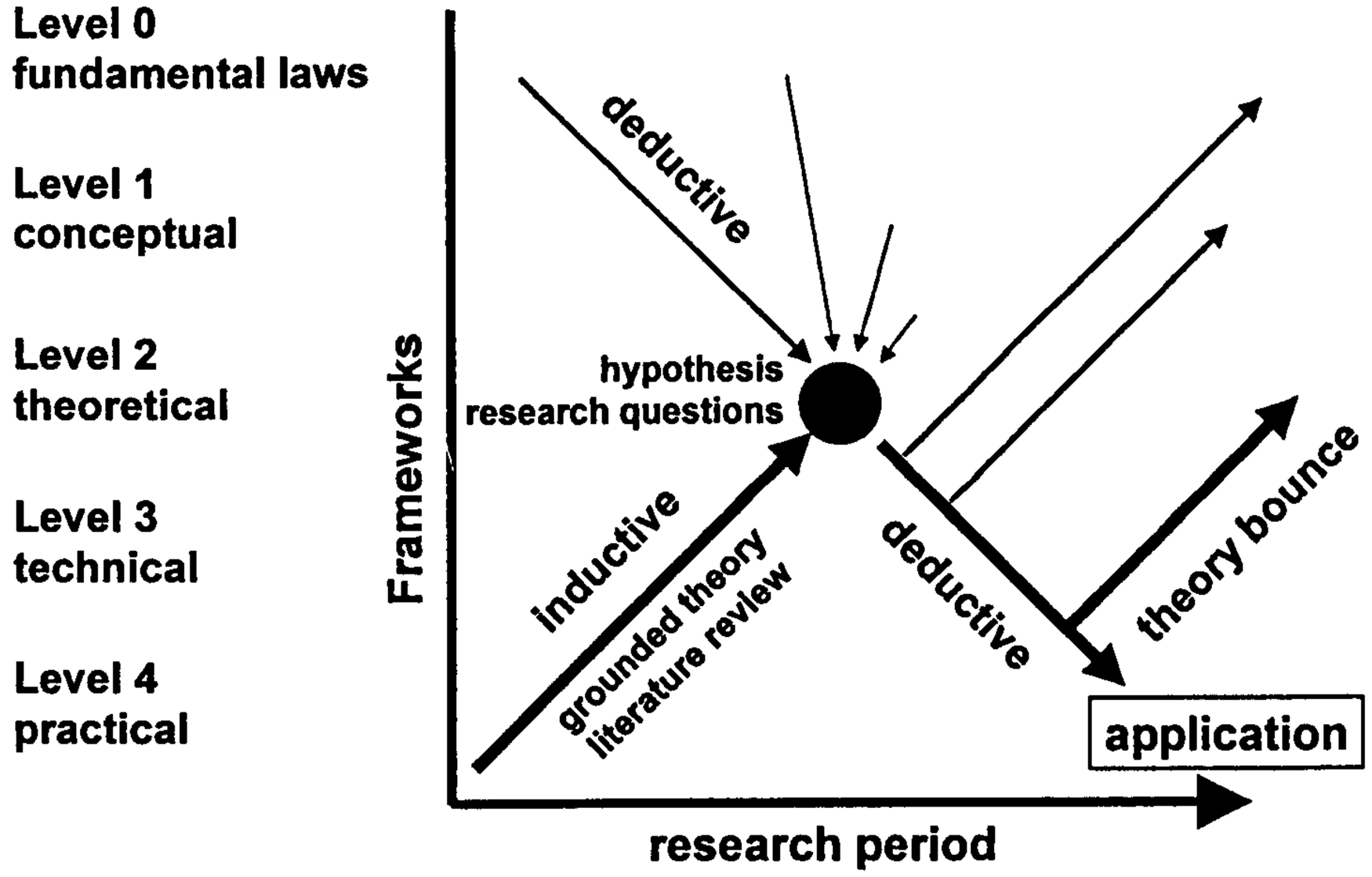


Figure 4.7 – Research diagram

4.011 Research proposal

The research proposal is that it is practical to develop a framework for the explicit exposition of the client value system, which includes all discretionary variables, for use in a value management workshop at the strategic briefing stage of construction projects. Of the prospective research methods tabulated in figure 4.6; case vignettes, action research, grounded theory, interviews, Delphi, and mathematical logic are all valid options.

Case vignettes, interviews, and Delphi are valid methods for building a framework based upon opinion. This means operating at the practical level and through inductive research arrive at a theory.

Grounded theory would require longitudinal studies involving the use of some form of analysis of ongoing projects or, more likely in terms of opportunity and resources, undertake a large questionnaire or interview survey from which theory can be deduced. This is also operating at the practical level and building theory at that level.

Mathematical logic is attractive from the perspective of operating at the theoretical level approaching the identification of client value variables in structured hierarchies. However, it is research which can only be undertaken once the variables have been identified and in the context of this doctoral research is one step too far.

Action research requires inductive research to build a proposition which is tested through deductive experimentation to form a theory. The theory may be developed inductively to form a developed hypothesis which may be tested deductively to form a developed theory. Action research means undertaking experimentation at the practical level and is high risk (low control by the researchers once the experiment is running as figure 4.5). The advantage of action research is that the results are based upon fact and not opinion. For the pragmatic reason that involvement in relevant strategic or project briefing value management workshops was assured during the research period action research was adopted as the preferred methodology.

4.012 A review of action research

Susman and Evered (1978) cite Kurt Lewin (1946) who introduced the term "Action Research" to denote a social science research approach which combines the generation of theory with changes to a social system which includes the researcher. They also cite Rapoport's (1970: 499) definition "action research aims to contribute both to the practical concerns of people in any immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework." These definitions have been refined by Susman and Evered to include a collaborative activity between the researcher and the client which;

- is a mode of inquiry within the corporate organisation that generates knowledge for the solution of problems
- is agnostic in its application
- has a future orientation,
- is a collaborative exercise between the researcher and the client, with the aim of developing the client organisation and generating or proving research propositions.

The small face-to-face group is considered to be the primary medium through which the problem situation may be recognised and changed and in which the interests of the

various parties to this process may be developed within an acceptable ethical framework.

Susman and Evered cite Chein, et al (1948) who differentiate between:

- diagnostic action research in which data is collected by the researcher for diagnosis by the client,
- empirical action research where researcher evaluates the actions undertaken by the client system and feeds the results back,
- participant action research in which diagnostic and action planning activity is carried out in collaboration between the researcher and the client,
- experimental action research in which the researcher and client collaborate to set up an experiment for taking an action and evaluating its consequences.

In the context of research undertaken within a value management workshop scenario it is participant action research which is being carried out since although the activity is planned between the researcher and the client the methodology is driven by the researcher.

Susman and Evered state that within the Action Research method there are five phases:

- diagnosing
- action planning
- action taking
- evaluating
- specifying learning.

These are illustrated in Figure 4.8

Costello (2003: p7-8) implies that the five phases can be simplified to four (Plan – Act – Observe – Reflect) and states that they may need to be iterative in order to achieve a result. This concept is illustrated in figure 4.9, retaining Susman & Evered's headings

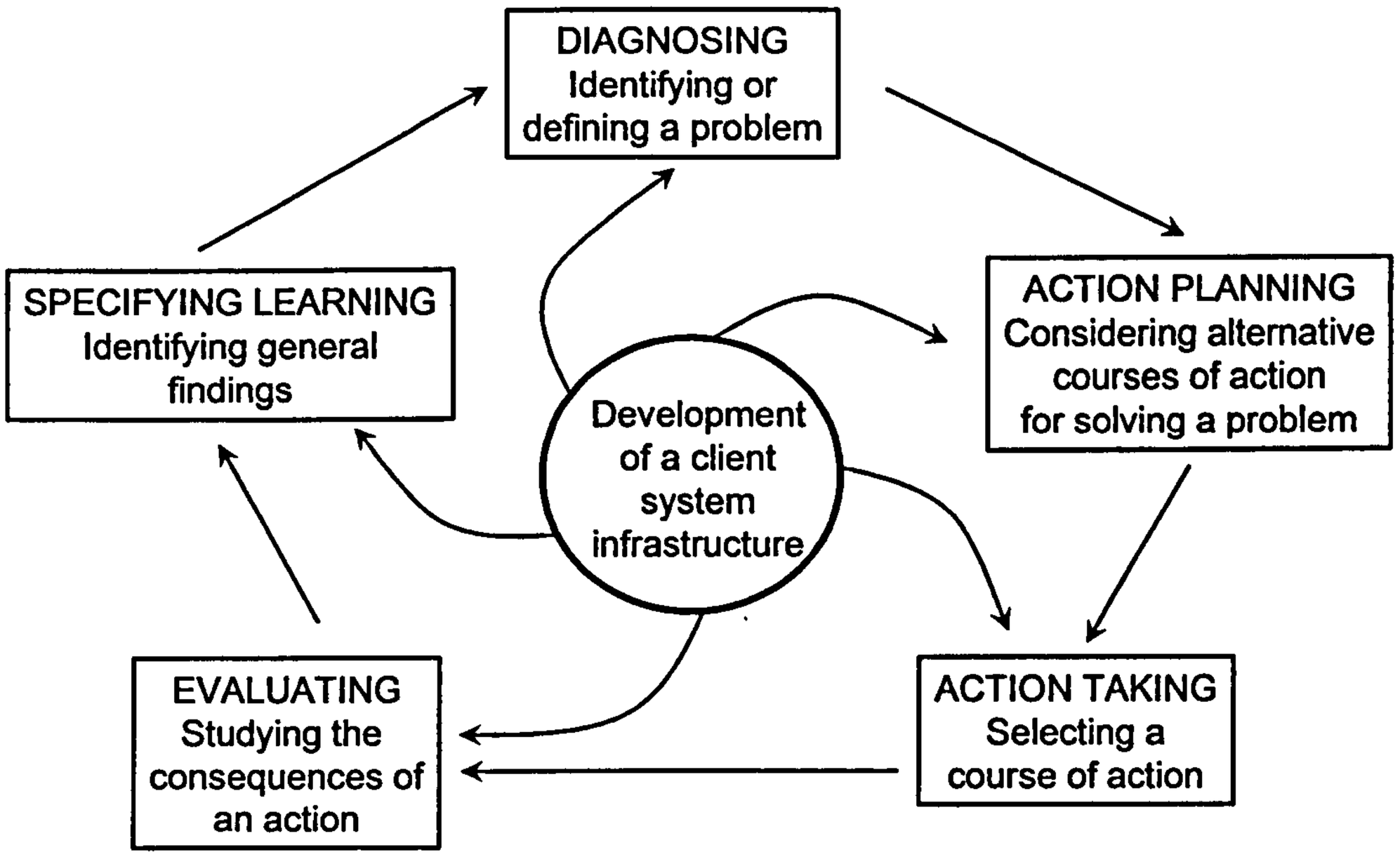


Figure 4.8 The cyclical process of action research (after Susman and Evered: 1978)

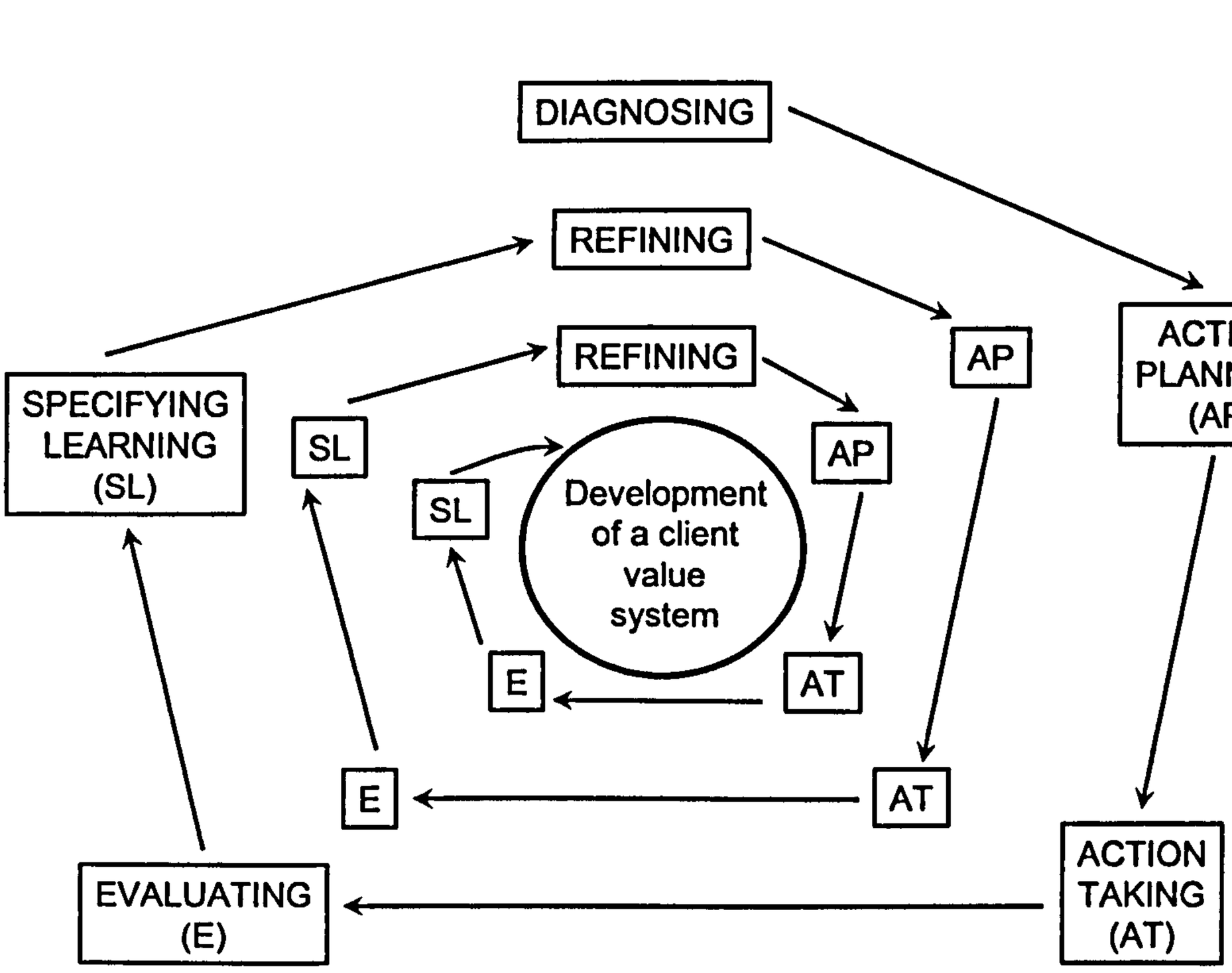


Figure 4.9 The iterative nature of action research (adapted from Susman and Evered: 1978 and Costello: 2003 p8)

McKay and Marshall (2002) recognise two drivers for action research, one concerned with practical problem-solving in real-world situations and the other concerned with developing new theory. They state that prior to activity the client and the researcher should establish and agree the extent of the intervention involved. They outline two academically acceptable approaches to action research; firstly, where a research question exists and a real world problem situation arises which permits the question to be addressed and secondly where a real world problem is the trigger for the development of a research proposition. In both situations the action research has the potential to prove or disprove the proposition and/or improve the problem situation. The situation in which a real world problem arises and a consultancy intervention occurs in the absence of a research proposition is not action research even where reflection may occur post-project. This third situation is more conducive to grounded theory or case based reasoning.

Costello (2003: p40) discusses the ethical issues present when action research is undertaken within the researcher's employer organisation. While these are acknowledged they are not of concern in the envisaged action research context of a value management workshop.

4.013 Summary

The research methodology to be followed is that of action research. The research proposal is that it is practical to develop a framework for the explicit exposition of the client value system, which includes all discretionary variables, for use in a value management workshop at the strategic briefing stage of construction projects.

Following the logic of figure 4.7 the inductive research is based upon the literature review in chapters 2 and 3 on the systems in place for value management and briefing. Further inductive research will concentrate upon the development of a framework for the explicit exposition of the client value system through the study of value. A proposition will be developed in the form of a model structure conducive for use in the structured team based activity which is characteristic of a value management workshop. The population of the model with data will be undertaken by the workshop team led by a facilitator. The facilitator will be the researcher and will be involved in an activity which is neutral on the positivist/social constructivist continuum (figure 4.4) but will

involve risk in the context of control (figure 4.5). The client will be informed of the intention to run a client value system matrix. The risk will be managed in the workshop by resorting to the time/cost/quality triangle if the experiment appears to be failing catastrophically. The research will propose a theoretical structure which will obey the rules expounded by Wacker (1998).

4.014 References

Audi, R 1999, *The Cambridge dictionary of philosophy*, Cambridge University Press.

Buckley, J W, Buckley, M H and Chiang, H F 1976, *Research methodology and business decisions*, National Association of Accountants, New York and The Society of Industrial Accountants of Canada, Hamilton.

Chein, IS, Cook, SW and Harding J 1948, The field of action research *American Psychologist* Vol3, pp 43 – 50 (from Susman and Evered)

Costello, PJM 2003, *Action research,* Continuum, London.

Creswell ,J W 1998, *Qualitative inquiry and research design*, Sage Publications, London.

Easterby-Smith, M, Thorpe, R and Lowe, A 2002, *Management research: an introduction 2nd Edition*, Sage Publications London.

Fellows, R and Lui, A 1997, *Research methods for construction* Blackwell Science, Oxford.

Gill, J and Johnson, P 2002 *Research methods for managers, 3rd edition*, Sage Publications, London.

Hershberger, RG 1999, *Architectural programming and pre design manager* McGraw-Hill

Hunt, VD 1996, *Process mapping: how to reengineer your business processes,* John Wiley and Sons.

Langford, D and Male, S 2001, *Strategic management in construction,* Blackwell Science.

Lewin, K 1946, Action research and minority problems *Journal of Social Issues* Vol 2 p 34 – 46 (from Susman and Evered)

McKay, J and Marshall, P 2002, Action Research: a guide to process and procedure in *proceedings of the European conference on research methodology for business and management studies* University of Reading 29 - 30th April, 2002 pages 219 - 227

Miles, L D 1961, *Techniques of value analysis and engineering* McGraw Hill New York.

Naoum, SG 1998, *Dissertation research and writing for construction students*, Elsevier, Oxford.

Ottosson, S 2003, Participation action research – a key to improved knowledge of management, *Technovation*, vol **23** 87-94

Rigby, PH 1965, *Conceptual foundations of business research*, Wiley, New York.

Rapoport, RN 1970, Three dilemmas of action research *Human Behaviours* Vol **23**, p 499 – 513 (from Susman and Evered)

Susman, G I and Evered, R D 1978, An assessment of the scientific merits of action research *Administrative Science Quarterly* vol **23** no.4 (December 1978) p582 – 603

Wacker, J G 1998, A definition of theory: research guidelines for different theory building research methods in operations management, *Journal of Operations Management* vol**16** p361-385.

Yin, RK 1994, *Case study research design and methods 2nd edition*, Sage Publications, California.

Chapter 5 A Theory of Value

5.01 Introduction

This chapter is a review and deductive development of the theories of value as a foundation for the development of a technical model for the explicit exposition of the client value system. With reference to figure 4.4 and the attendant discussions, there are no fundamental laws of value. Indeed with reference to the writings of the early part of the twentieth century it could be argued that there are no conceptual variables with which to define and/or measure value. This chapter commences with two reviews, firstly "The Definition of Value" by Ralph Barton Perry (Perry: 1914) which has as its introduction an analysis of the writings of contemporary philosophers, and, secondly "Quality and Value" by Philip Blair Rice (Rice: 1943) which takes the analysis of value further and explains the concept of quality. The writings of other authors, and a synthesis of the development of the definition of value, increment to the point where a tentative model can be developed for practical testing.

5.02 The definition of value

Perry (1914) cites Moore (1903) in the initial posing of the question "what is value generically?" by rehearsing the contemporary argument that value can not be defined, stating that value is adjectival rather than substantive hence a valuable stone can only be defined as a stone which has value i.e. value has no meaning in the absence of the stone. Perry agues that the case for non definition is only sound if value were incapable of analysis and this is clearly not the case since a stone in a gold setting is likely to have more value than the stone alone i.e. there must be some attribute of the setting which is capable of description. Perry commences the discussion of value with reference to goodness proposing simplistically, that something which is good has value. Perry agrees with Moore's assessment of goodness which is discussed in the context of pleasure or hedonism the greatest of which, Moore argues, are personal affection and aesthetic enjoyment. Perry considers this definition of goodness to be too narrow and discusses value from the perspective of harmony and fitness asserting that value exists when something can be described as "good for", taking the concept of "goodness" as relative to interest i.e. something becomes of value when interest is taken in it. It should

be noted that this debate does not imply ownership or necessarily the desire for ownership, it is argued that it is simply required for interest and/or pleasure to be derived, for something to be of value. However, Perry states "it is one thing to assert that the fulfilment of interest is essential to value and another thing to say that it constitutes a sufficient definition.....interest is not an immediate cognition of value qualities in its object, but is a mode of the organism, enacted, sensed, or possibly felt and qualifying the object through being a response to it. To like or dislike an object is to create that object's value."

Perry (1914) defines intrinsic value as being possessed by the object-interest complex whereas extrinsic value is possessed by the object itself. This introduces a difference in the perspective of value from those with an intrinsic value interest (the user) and those with an extrinsic value interest (the observer). This leads Perry into a debate on the measurement of value. Perry states:

> ".....to discover a criterion by which superiority or inferiority shall be assigned to values themselves [is] the desire to justify a criticism of the natural or empirical values. It seems necessary to provide for a scale or hierarchy in which inclination shall be subordinated to duty, impulse to a "norm", or enjoyment to an ideal. There is but one way in which this can be accomplished without abandoning our present definition of value, and that is by employing a quantitative scale. In such procedure no new conception of value is introduced; interest-fulfilments are merely compounded and measured. If, on the other hand, interest-fulfilments are judged *higher* or *lower* by some other standard, then that ulterior standard is really definitive of value".

This quotation sums up the case made by Perry for the definition of value and its quantification. The test is described as being the determination of the truth or falsity of the assumptions which mediate value in every case where value is realised through being the object of a true judgement or by being founded on a true judgement. The argument being made by Perry requires the manufacture of those concepts which adequately describe value. These concepts will be measured on a notional scale possibly requiring more than one sense for their interpretation. In chapter 4 it was

stated that the scale will be ordinal and relate to such factors as safety, security, goodness, compassion, excitement, comfort, etc.

5.03 Quality and value

Rice (1943) commences the debate on quality and value by focusing on the reluctance of philosophers to define quality. Rice states "The difficulty arises partly from the fact that the term 'quality' as applied to values has a multiplicity of meanings" giving the example of a piece of cloth being better quality than another because it is warmer and more durable. However, an alternative piece of cloth may be better quality because of its exquisite sensation of sight and touch even although it is flimsy. Rice concludes with the observation that value in this context is intrinsic and instrumental i.e. it relates solely on the perspective of the user.

Rice states that contemporary empirical and naturalistic thinking treats value as a function of needs, desires, interests and satisfaction referring to the definition by Perry (1918) of the good or valuable being 'any object of any interest'. Rice's view is that, as stated by Perry, the theory does not distinguish between intrinsic and instrumental value implying that the intrinsic value of X is the value that X has solely by virtue of its inherent, essential nature where that nature is explained in terms of goodness, interest and/or desire. Instrumental value comes from the means by which the goodness, interest and/or desire is satisfied. Therefore if a sensation of speed is of intrinsic value then a sports car, speed boat, or roller coaster has instrumental value.

Rice introduces the concept of conative value, defined as that which springs from the pursuit of a goal or purpose and quotes Aristotle "pleasure accompanies the performance of any unimpeded activity" in a debate which concludes that pleasure can also be attained from the release of tensions which accompany the pursuit of a goal or purpose which in some way is impeded. Rice describes conative value as being comprised of:

- Practical value: the manipulation of the environment and eventual possession or consumption of a material object or the provision of a service.
- Moral value: the integration of the individual's desires with the interests of others.

- Intellectual value: the prompting of critical appreciation by others, the pursuit of a goal in which the pleasure is derived from the intellectual activity of others. Rice notes that this value is largely extrinsic.
- Aesthetic value: where the goal is set by the artist where the object is beyond expectations containing an element of surprise and/or superfluity relative to the specific purposes of the object or service. This again can be value shared and therefore is in part extrinsic.

Rice concludes that quality is the qualitative valuation of value through;

- an analysis of the instrumental values of an object by the specification of the end to which the object is useful and what properties constitute its utility
- the description of the conative values i.e. the goals to be achieved in terms of practical, moral, intellectual and aesthetic values.
- the assessment of the extrinsic values, principally aesthetics, through critical evaluation.

5.04 A theoretical value model – Part 1 establishing the rules for basic intrinsic value

Perry (1914) and Rice (1943) have set down the framework within which a value system can be described, confirming that such a system is practical and that it will be based upon concepts measured on a quantitative scale. The perspective of value will be based upon the views of the specifier and will be logically intrinsic. Extrinsic value may be the concern of stakeholders who may wish to influence the intellectual and aesthetic value but the primary goal and the instrument for achieving that will be the concern of the specifier.

Audi (1999) introduces the concept of contributory value where the setting enhances the value of the object. For example a factory within a high technology industrial estate may attract contributory value from its surroundings. Zimmerman (2001:p160) consolidates and develops the theory of intrinsic value distinguishing between basic and non-basic intrinsic value. Non-basic intrinsic value is described as the situation in which goodness is inherited i.e. it inherits contributory value. Basic intrinsic value is

where the value exists within the variables which make up intrinsic value, excluding contributory value. Zimmerman defines the rules for basic intrinsic value as:

For any state S that has basic intrinsic value:

If S_1.....S_n are proper parts of S

S_1.....S_n have no parts in common

S_1.....S_n have actual intrinsic value

And there is no part of S that has actual intrinsic value which is not a part of S_1.....S_n

Then the intrinsic value of S is the same as the sum of the intrinsic values of S_1.....S_n.

In the context of the theoretical value model, S represents the client value system. S_1.....S_n are the proper, inclusive, intrinsic variables which make up the client value system. No parts of the variables are correlated and all variables should have intrinsic value. This does not prevent the variables from having intrinsic and extrinsic values but from Zimmerman's work the extrinsic element is ignored when undertaking the summation.

5.05 A theoretical value model – Part 2 establishing the variables

In chapter 2 various expressions of value were abstracted from the reviewed texts. The most popular expression for value was as a relationship between function and cost. VM/VE exercises seek functionally equivalent options to meet users needs, desires and expectations, with varied cost, quality and worth attributes and are undertaken for the purpose of improving value. This concept can be summarised as "the lowest cost to reliably provide the required functions or service at the desired time and place and with the essential quality" (Mudge: 1996 p13). Value is expressed in a number of the reviewed texts as:

- Exchange value, relates to worth or the monetary sums which products can be traded. This may be different to market value defined as the sale price of a product under the voluntary conditions of a willing buyer and a willing seller.

- Esteem value relates to oneself or the monetary amount to be paid for functions of prestige, appearance and/or other non-quantifiable benefits. It may also refer to the monetary measure of the functions of a product that contributes to its desirability or sale (including obtaining for the sake of possession).
- Use value relates to need or the life cycle cost considering user function only or those properties that accomplish a use by some work or service.

Burt (1975) states that maximum value is obtained from a required level of quality at least cost, the highest level of quality for a given cost or from an optimum compromise between the two.

Best & De Valence (1999 p14) state that value is a relationship between time, cost and quality, and illustrate the time, cost, quality triangle. The technique is commonly used in project management and illustrated on numerous commercial websites and although accredited to Dr Martin Barnes academic debate is thin and citations dominated by Atkinson (1999).

At this stage the intrinsic basic variables were considered as:

Time

Cost

Function – fitness for purpose

Internal and external quality (fabric and environment)

Aesthetic – esteem

Exchange

Impact on the environment

The environmental variable had not been mentioned in any review of value but was perceived as becoming of increasing concern to a number of clients.

5.06 A structured improvement of the time cost quality triangle

Until this point in time the most common representation of client value in value management studies was the time, cost quality triangle illustrated in figure 5.1.

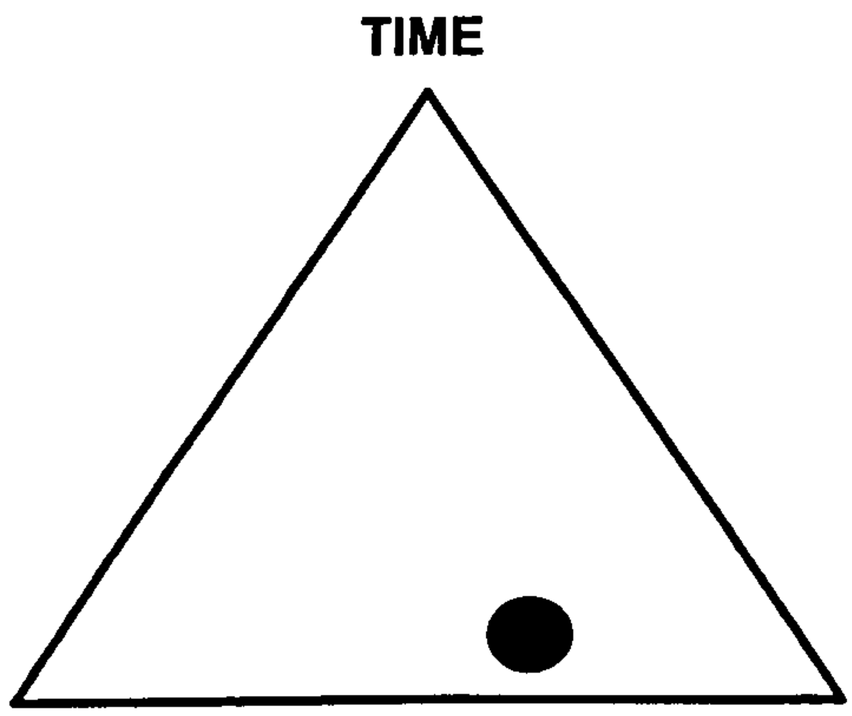


Figure 5.1 Time, Cost, Quality Triangle

The facilitator would make use of the diagram to ask the client "which is more important to you on this project time, cost or quality". A debate would ensue and eventually a dot would be inserted on the diagram to represent the client's values. The diagram above represents the conclusion of a debate on the construction of a new law court. The court was a replacement of an existing 120 year old court building. The project had been 10 years in gestation. The summary of the debate was that in the context of this building time was demonstrably not the primary constraint. Since the new courthouse was being planned with a 150 year design life quality was more important than cost although the budget was relatively inflexible.

An opportunity arose to attempt to improve the debate through a refinement of the simple question. The project was for the replacement of a communications centre for Defence Estates. The value management exercise was a training exercise for facilities management staff but was to be based upon a recently completed project. The team comprised the works officer for the communications centre project, a main contractor's representative from the design/build contractor for the project and 11 facilitates management staff from various Defence establishments in the south of England. The client value system stage was configured as an Action Research exercise in accordance with the rules established in chapter 4.

A table was drawn on a flipchart with the headings determined above. The team were asked to enter a score out of 10 for each element. Following the scoring the time, cost, quality triangle was completed.

Time – for construction and commissioning	10
Cost – CAPEX and OPEX	7
Internal and external quality (fabric and environment)	5
Impact on the environment	3
Exchange	1
Function – fitness for purpose	8
Aesthetic – esteem	3

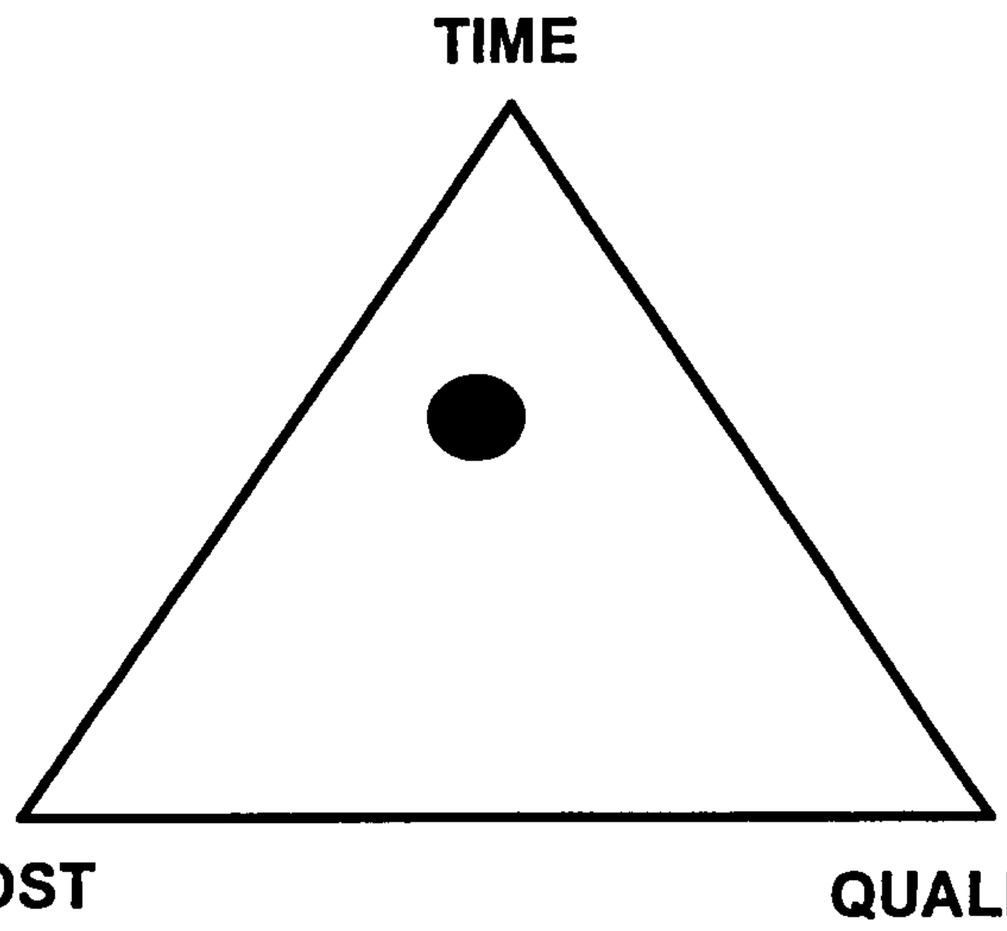


Figure 5.2 – First action research experiment to represent client value system

The team understood the task which was completed efficiently. However, the time to complete the time, cost, quality triangle was not measurably decreased from those workshops experienced without the completion of the preceding table and the debate was still typical of prior workshops. There was a disconnect between the two stages of the process which needed to be resolved. Further there was concern that the scoring was not on a ratio scale.

The results from this experiment led to the conclusion that a two stage process to arrive at the familiar time, cost, quality triangle was not productive although the debate was extended. It was necessary to find an alternative method which was meaningful in its final presentation and involved one step to completion.

5.07 A theoretical value model – Part 3 measuring the variables in the context of a value management workshop

The client value system is an expression of attitude to variables of value. The purpose of the model is to make explicit the attitudes to the value of a construction project such that product design and process decisions can be taken in that knowledge. The aim is not to construct an aid for deciding between product design and process options but to lay the foundation for that decision making. In the context of value management it is preferable that the selected method be capable of being used in a workshop environment. There is nothing wrong with undertaking pre-workshop interviews and eliciting the various views regarding the client value system however the point of the workshop is to undertake the elicitation in open forum such that all can understand the logic of the attitudes being made explicit.

Oppenheim (1966 p121-123) sets five rules for attitude measurement techniques which should be:

1. unidimensional i.e. the technique should present one question at a time and use a constant clear method for its elicitation.
2. "linear" with equal or equal-appearing intervals i.e. the scale should be nominal, ordinal or interval.
3. reliable with consistency in application
4. valid in the context of measuring what is expected to be measured
5. with reproducible results i.e. the same test in a similar situation should give similar outcomes.

The methods considered as possible contenders for the model are listed in figure 5.3.

Method	Brief Description	Applicability to Client Value System Model
Social-distance scales	A method of measuring attitude to given criteria based upon a given descriptive scale. Used initially to determine attitude to different races in a social context. (Oppenheim: 1966)	A method used in interview or possibly as a questionnaire. Result is a ranking of attitude based upon pre-conceived criteria. Could be a valid method although difficult to use in a workshop environment.

Simple paired comparison	A method of ranking criteria based upon considering the importance of each criterion two at a time. Considered an accurate but laborious method of ranking. (Oppenheim:1966)	A method shunned by social scientists due to the time taken in the elicitation process. A survey of only 10 objects would require 45 paired comparisons. Very practical for a workshop since the reason for the choice of the ranking of the 7 variables would be explicit and rehearsed in front of the workshop team.
Thurstone scales, Likert scales	Similar to social distance scales each requires a reaction to the importance of criteria usually based on a five point scale from excellent to poor or strongly agree to strongly disagree. (Oppenheim: 1966)	Widely used in social or product research to determine attitude based on the strength of agreement with pre-determined questions. The reason for the answer to the question is not given. Not suitable for workshop application.
Delphi	A technique developed by the RAND Corporation to elicit expert opinion from questionnaires. The technique is iterative and seeks to establish a consensus viewpoint against which a strategy can be developed. A focus group may be employed following a round of questionnaire survey. (Langford and Male: 2001).	Could be used to illicit a client value system based upon criteria refined during a round of pre-workshop questionnaire or interview surveys. These could be discussed in the workshop as a focus group. A possible danger in allowing entrenched positions to form such that the workshop becomes a forum for resolving differences rather than a forum for discovery.
Multi attribute utility analysis, multi attribute rating technique	A formal approach for deriving a function (U) that quantifies a decision maker's preference over available alternatives in the form: $U_{max} = Ay + Bx + Cz$ Where A, B and C are weights given to measured factors y,x,z. (Keeney and Raiffa:1976)	This is one step too far in the model development. The client value system effectively makes explicit the weights against which options can be measured.

The Analytic Hierarchy Process	Developed by Thomas L Saaty (1980) as a rigorous approach to the modelling of unstructured problems in the economic, social and management sciences based upon prioritising elements in the hierarchy.	At first sight this appeared to be a more robust methodology than simple paired comparison and is considered in more detail below before final rejection.

Figure 5.3 Possible structures for the client value system matrix

An analysis of Simple Paired Comparison and The Analytic Hierarchy Process

The process of Simple Paired Comparison is a means of organising a number of variables into a hierarchical order by asking the question of each pair of variables "which is more important to you A or B?" This has the advantage that the process can be run in a workshop environment where knowledge is generated through the discussion which accompanies each question. The result is a hierarchy on an ordinal scale.

The Analytic Hierarchy Process (AHP) as described by Saaty (1980) appeared at first sight to be worthy of investigation because of its robust methodology and its striving towards a ratio scale. Saaty defines a hierarchy (page 11) as "a particular type of system, which is based on the assumption that the entities, which we have identified, can be grouped into disjoint sets, with the entities of one group ..... influenced by the entities of only one other group". This is illustrated in figure 5.4. In this figure A is influenced by B and C but B is not influenced by C. Similarly B is influenced by D, E, F and G but D is not influenced by E, F or G. Saaty describes the hierarchical composition of priorities (page 25) in which a number of criteria are used to decide between options. It is this and the focus on choice between alternatives which made Saaty's work attractive.

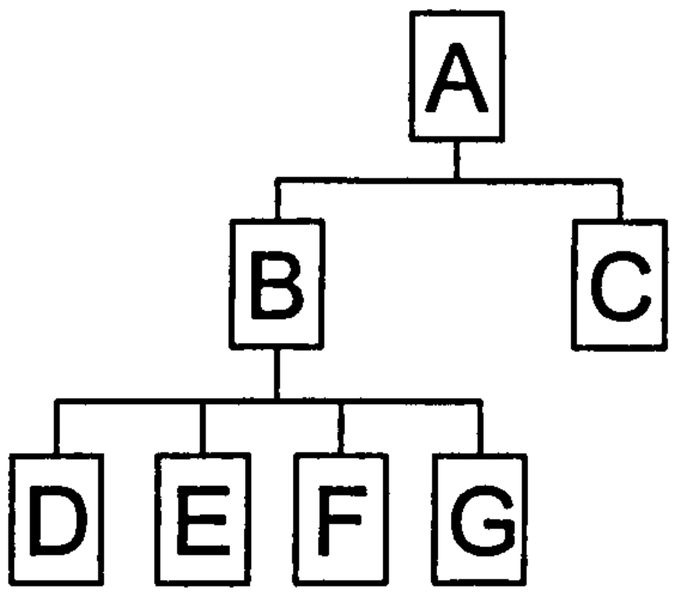


Figure 5.4 Hierarchy Process (adapted from Saaty: 1980)

A question which permeates Saaty's (1986) work is that of the introduction of another option which may change the hierarchy in some way. Saaty's example is that given a single apple and a single orange the apple might be preferred to the orange, but with the introduction of more apples then the orange might become more attractive because of its uniqueness. On the other hand a gold bar would be preferred to an iron bar. If we introduce more gold bars then the gold bar would still be more attractive to the iron bar as in this context uniqueness would not matter. This leads to further consideration (Saaty: 1993) of the ranking of alternatives and the mathematical representation of options and the extent to which rank is preserved when the uniqueness is considered.

However, as Saaty admits (1980: p30) the operation of the method within a workshop environment can be difficult with "wear and tear" setting in early. The method has more validity at the stage when solution options are available rather than at the stage when criteria are selected. However, the comments made (Saaty:1980: p33 – 34) on the structuring of the criteria and specifically the extent to which the criteria are influenced by the actors concerned and the fact that criteria preferences may change over time all have an impact on this study.

It is concluded that the simple paired comparison method is to be used for the derivation of the client value system based upon the criteria identified. The AHP method will have application at the stage when options become available for consideration.

5.08 A theoretical value model – Part 4 application of a client value system model

At this stage in the development of the client value system model a further opportunity presented itself for the use of the model. The project for a new visitors centre at a national park in Scotland was being promoted by a charitable heritage organisation that was keen to undertake a value management exercise. Although the client value system model was in a formative stage it was decided to use the model as a part of the workshop agenda, in the place of the usual time cost and quality discussion described above. The aim for the workshop was to focus the whole team on a common view of the client value system. The paired comparison model illustrated in figure 5.4 was used as a team orientated exercise to rank the intrinsic basic variables described above.

This exercise was configured as an action research project. Initial discussions with the client were supplemented by a number of interviews with key stakeholders. Two facilitators were to undertake the exercise permitting one to act as observer at all times. The experiment was carefully configured before being carried out. This met all the requirements of a properly structured action research study as described in chapter 4.

During the workshop at the appropriate point in the agenda the value manager asked the team to rank the variables in pairs by asking a question in the form "which is more important, time or cost?" In this case cost was seen as more important and the letter B was entered in the appropriate box. This questioning is repeated for each pair of variables. At the end of the exercise the number of A's B's and C's etc is totalled to give an overall ranking.

The team comprised consultant project architects (3), consultant structural engineer, consultant quantity surveyor, client representatives of different head office departments (7), the client's in house facilities management (2), the park ranger (employed by the client) and the local councillor.

Exchange i.e. for how much the building could be sold was not considered as a factor as the building will never be sold and was not included in the pairs. Cost was seen as the least important factor when compared with the other factors. Time was seen also to be of little significance in relation to the others. The team therefore judged the relative importance, from highest to lowest to be, fitness for purpose, then the minimising of environmental impact, then quality and then aesthetic.

The result reflects the views of the whole team, client executive, client operations and design team. Debate, mostly centred on quality, which could not be resolved by consensus, was resolved by voting.

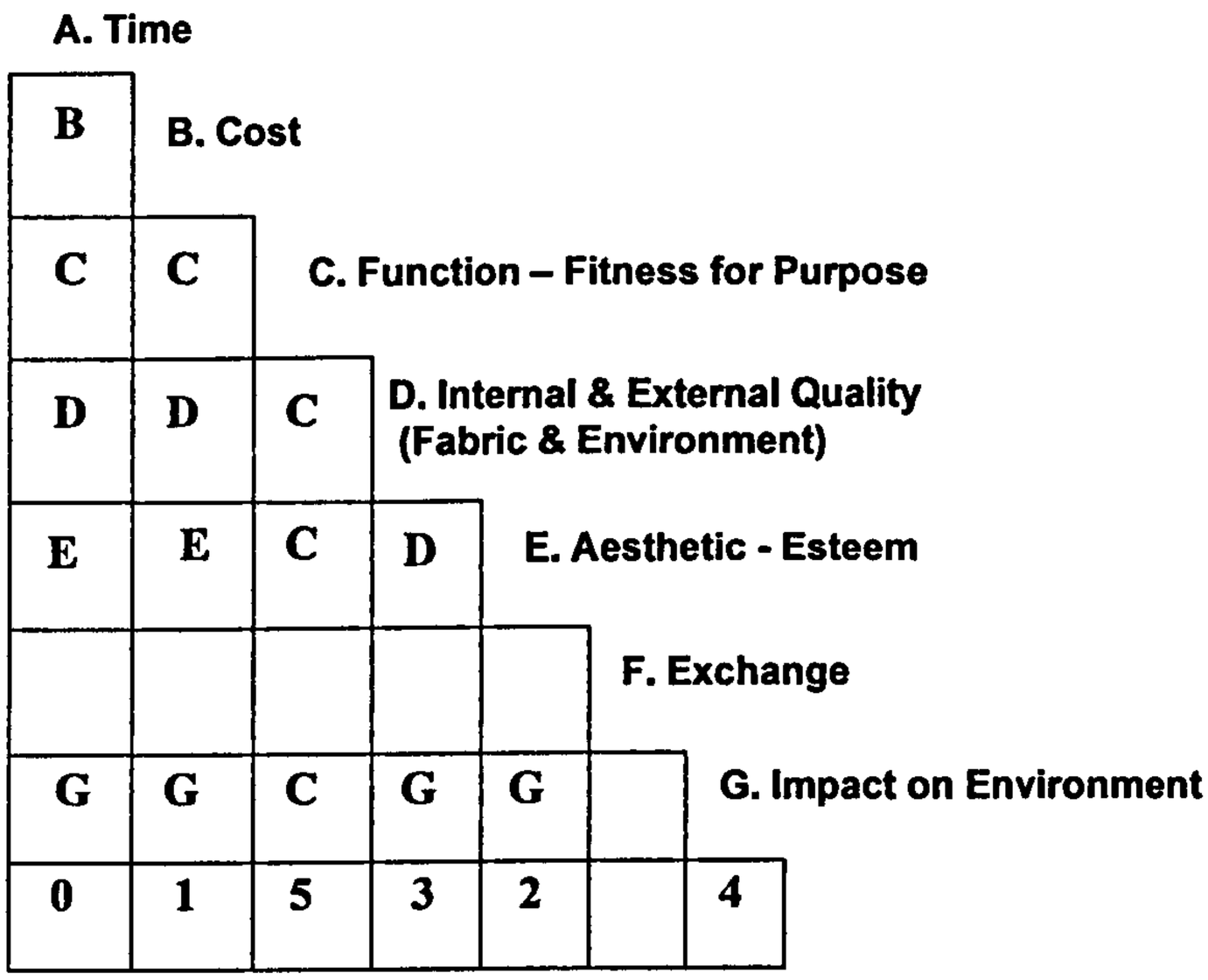


Figure 5.5 Paired comparison model

Intrinsic Basic Variable	Rank	Weight
1. Function – fitness for purpose	1	5
2. Impact on environment	2	4
3. Internal & external quality	3	3
4. Aesthetic - esteem	4	2
5. Cost	5	1
6. Time	6	0
7. Exchange (not considered)	NA	NA

Figure 5.6 – Ranking exercise

5.09 A theoretical value model – Part 5 critique of the client value system matrix

The analysis of the technique from the perspective of the two facilitators (one who sat as recorder/observer) can be summarised as:

- The use of the paired comparison technique was judged a success within a workshop environment; the 15 questions generated by the model were answered within one hour. However, the phrasing of the question was important and it was often necessary to ask each question from either the perspective of "which is more important" or "which would you be prepared to sacrifice".

- The discussion generated by each question ensured that each member of the team was clear regarding the issues behind each variable.

- There were clearly three groups responding – the client executive, the client operations team and the design consultants (dominated by the three architects). Due to the fact that a vote had to be taken there was concern that the result did not reflect a consensus of views of the three groups.

- The councillor present did not take part in the debate and sat back as an observer.

- The design team became obstinate on certain elements of the value system, particularly in respect of environment. The architects were unable to distinguish between internal and external quality in terms of finishes, fittings, furnishings and space and the extra-over for aesthetic expression for esteem.

- An analysis of the workshop proceedings revealed that the design team, particularly the architects, were attempting to influence vocally the client value system rather than to learn from the debate.

- A common definition of quality proved elusive

5.010 Summary

In a traditionally procured construction project the client value system becomes established through a process of trial and error on the part of the designers. It evolves slowly over time as the design team present and re-presents schemes that reflect their current understanding of the client value system. With each iteration, the designers take

one step closer to full understanding. The client often based on a judgment of what is not required or not liked, also makes an incremental move towards a more overt expression of their value criteria. However, the newer procurement systems are not sympathetic to this slow iterative process. The purpose of the action research exercise is to make the client value system overt in a single operation. As reviewed by Perry earlier, this requires a quantitative scale or hierarchy. An analysis of attitude measurement techniques highlighted simple paired comparison as a methodology which not only obeys Oppenheim's five rules for attitude measurement but is also suitable for use within a workshop environment and can be used without any pre work such as interviews or questionnaires.

The second action research experiment (the first to use paired comparison) highlighted a number of issues and areas for consideration and improvement. During the experiment Perry's paradigm of those with intrinsic value interest and those with extrinsic value interest were demonstrated. It is proposed in future to divide the team between those who have an intrinsic value interest as investor or user (the client) and those whose interest is extrinsic which in this case would include the design team and the contractor or any other organisation providing service to the construction project and who will effectively "leave the site" when the project becomes operational.

The second action research experiments also highlighted difficulties with the definition of quality. For the client value system to be meaningful the variables of time, cost, and quality must be capable of description and measurement. The key to making the client value system overt and therefore auditable, lies in an understanding of the description of quality. To derive a measurable statement of quality, quality itself needs to be uncovered and made explicit. Rice has indicated that quality is the valuation of the instrumental values of an object expressed in the specification of function; the goals to be achieved in terms of practical, moral, intellectual, and aesthetic values plus an appreciation of the extrinsic values, principally aesthetic, through critical evaluation. In this debate aesthetics has to be considered in its own right as a value criteria and not as the extra over portrayed in the action research workshop.

Finally and with reference to figures 4.7 and 4.9 further deductive work is required on the theories of quality and the theories of stakeholder values. A separate piece of

inductive work on key performance indicators appears to offer a possible solution to those factors which should be considered in determining quality and value.

The conclusion is that while cost and time are reasonably straightforward concepts quality is less so. This must lead to the question of how meaningful the time, cost, quality triangle really is when a client organisation is asked to reach a global conclusion with regard to quality. Duerk (1993 p27) gives a clue to an alternative approach by stating that design issues are processed through the filter of the values of the client. If value is comprised of cost, time and other factors summarised in the term quality then maybe it is more productive to examine the hidden factors of value and make them explicit. This will also be addressed in Chapter 6.

5.011 References

Atkinson, R 1999, Project management: cost time and quality, two best guesses and a phenomenon, it is time to accept other success criteria, *International Journal of Project Management*, Vol 17, no.6, 337 – 342.

Audi, R 1999, *The Cambridge Dictionary of Philosophy*, Cambridge University Press

Best, R and De Valence, G 1999, Building in value: pre-design issues, Arnold, Sydney.

Burt, ME 1975, *A survey of quality and value in building,* BRE

Duerk, DP 1993, *Architectural programming: information management for design,* Wiley, New York.

Langford, D and Male, S 2001, *Strategic management in construction,* Blackwell Science.

Moore, GE 1903, *Principia Ethica* Cambridge University Press (from Perry)

Mudge, A E 1996, *Value engineering: a systematic approach* J E Pohl Associates, Pittsburgh, Pennsylvania

Oppenheim, AN 1966, *Questionnaire design and attitude measurement,* Heinemann, London

Perry, RB 1914, The Definition of Value *The Journal of Philosophy, Psychology and Scientific Methods*, Vol 11 No 6 (Mar 12), 141-162

Perry, RB 1918, *General Theory of Value* Longmans New York Chapter V (from Rice)

Rice, PB 1943, Quality and Value, *The Journal of Philosophy,* Vol 40 No 13 (Jun 24), 337-348

Saaty, T L 1980, *The Analytic Hierarchy Process* McGraw Hill New York

Saaty, T L 1986, Scaling the Membership Function *European Journal of Operational Research* vol 25, 320 - 329.

Saaty, T L 1993, Experiments on Rank Preservation and Reversal in Relative Measurement, *Mathematical and Computer Modelling* Vol 17 No4/5 pages 13 – 18

Zimmerman, M 2001, *The Nature of Intrinsic Value*, Rowman and Littlefield.

Chapter 6 Development of the Client Value System Model

6.01 Introduction

Chapter 5 describes a theoretical development of value and two action research studies based upon that development. The conclusion of these studies points to three further developmental studies; firstly, an analysis of quality and value; secondly, a study of key performance indicators currently in use; and thirdly, a study of stakeholder and stakeholder values. The aim of these pieces of work is to reconfigure the client value system matrix for further action research testing. It is proposed to retain the paired comparison basis of the model as the original reasons for its adoption have not been compromised and the model worked well in practice.

Chapter 5 sets down the definitions of value, largely based upon the work of Perry and Rice, introduces the concepts of intrinsic and extrinsic value and also the terms practical value, moral value, intellectual value, aesthetic value and instrumental value. Intrinsic value is defined as being possessed by the object-interest complex and extrinsic value is possessed by the object itself. In the context of a building the object-interest complex lies with the client/user whereas the extrinsic value lies with those who have an observer function, which leads to a dilemma in the context of the design and construction team in that their involvement with the building is greater than that of a pure observer. However, the object-interest complex goes hand-in-hand with instrumental value. The project is of instrumental value to client in satisfying the primary goal which is to benefit commercially or socially from the investment. This chapter will explore in more detail the role of the design and construction team in the client value system framework.

6.02 Quality and value

Definitions of quality are few in number. Bicheno (2002 p8) quotes Deming who states that quality can only be defined in terms of customer satisfaction. There is no absolute measure – two customers may perceive a product or service differently. Juran (1988) defines quality as "the totality of features and characteristics of a product or service that bear on its ability to satisfy stated needs or implied needs. Quality consists of freedom from defects". This definition of quality is repeated in standards. Vorley (1998) quotes

Juran's definition of quality and comments that quality needs to cover more than utilitarian function, for example the inclusion of aesthetics. In addition to the constituents of quality other factors need to be considered, for example, the method of distribution, initial and running costs, user awareness and/or knowledge.

In "Zen and the Art of Motorcycle Maintenance" Pirsig (1991: p252) states:

> "why does everybody see Quality differently?..... Quality is shapeless, formless, indescribable. To see shapes and forms is to intellectualise. Quality is independent of any such shapes and forms. The names, the shapes and forms we give Quality depend only partly on the Quality. They also depend partly on the *a priori* images we have accumulated in our memory. We constantly seek to find, in the Quality event, analogies to our previous experiences..... The reason people see quality differently is because they come to it with different sets of analogies".

If this is true then it is logical to assume that individuals setting targets for attributes of quality must have sufficient experience or knowledge of an analogous event and have the tools and measures to assess that event. For example, someone working with polyester resins might be in a good position to be able to define adequate ventilation in a workshop where polyester resins are being used. However, without appropriate tools and measures may be unable to specify a quality ventilation system.

To take this one step further, two hotels are considered. The first hotel is sited on a busy arterial road leading from a major city. There is no air-conditioning and many rooms have a tendency to over heat. Rooms are basically furnished, each has an en-suite bathroom in reasonable condition but with some mould growth and evidence that the room has not been too well cleaned. The dining room and bar areas are reasonably comfortable and the quality of the food is good. The second hotel is also sited on a busy road but is fully air-conditioned and the rooms are sound proof. Rooms are large, well furnished with modern furniture in good condition. The en-suite bathroom is finished in marble, has a shower in addition to a bath and is immaculately clean. There is a choice of dining room and bar areas, which are all interesting and comfortable, and the food is very good.

The question arising from the logic of Pirsig is could the specification writer who had only ever stayed in a hotel of the first type envisage the second type. The answer is probably no unless other knowledge and experiences can be brought to bear, e.g. illustrations or descriptions in books, television programmes, standards of cleanliness in other situations, experience of air conditioned offices in similar locations. This dilemma is illustrated in figure 6.1. On a continuum from the highest degree of excellence achievable to the lowest provision of the basic function every individual will create a frame of reference based upon experience and knowledge, represented by the circle on the scale. The individual's target level of quality will be within the frame of reference. There is a high probability that because every individual's knowledge and experience is different then the frames of reference for all individuals will not be in the same place on the continuum.

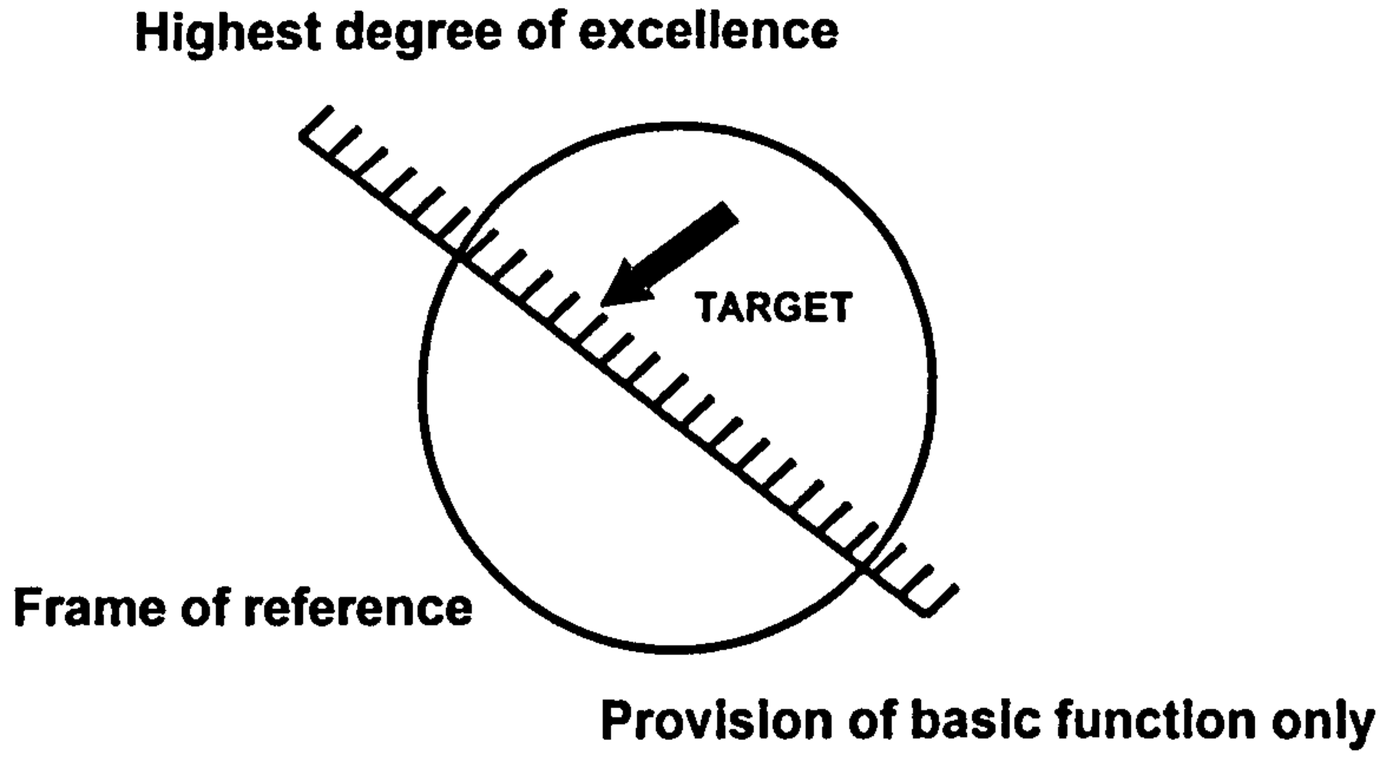


Figure 6.1 The Quality Continuum

The next logical question is what happens in the situation where the product/service receiver has more experience than the product/service specifier and/or supplier. The rational answer to this question is that there is a high probability of the provision of a poorer quality product or a poorer quality service to the receiver than that expected. A way around this dilemma is to ensure that the appropriate experience is brought to the writing of the specification and suitable models are available for the interrogation of the experience of the receiver of the service.

Bicheno (2000: p170) describes the Kano model developed by the Japanese quality guru Dr Noriaki Kano who states that maximum quality is attained when targeted characteristics are achieved and the customer is delighted. There are three variables within the model. These are 'basic factors', 'performance factors' and 'delighters', which have a relationship to the presence of quality characteristics and customer satisfaction. These variables are included in the Kano model, illustrated in figure 6.2 and the quality matrix, figure 6.3.

In the Kano model a basic characteristic is expected to be present, the customer will be dissatisfied if it is absent and only neutral if the characteristic is completely fulfilled. The performance characteristic relates to the essential function. The customer will be more satisfied if higher levels of performance are achieved. The delighter is the extra characteristic that was not expected by the customer. There is however a time dimension to the model such that the three variables will tend to sink over time, i.e. what once delighted is now expected and higher levels of performance are always sought. For example, power steering on small cars as a standard feature once delighted customers but now power steering is expected as a basic characteristic and its absence would lead to dissatisfaction.

A suitable model for interrogation must address the means by which quality is determined. This relates to the work of Perry (1914) discussed in chapter 5 in which he states that value is a "mode of the organism, enacted, sensed, or possibly felt and qualifying the object through being a response to it". Rice (1943), also discussed in chapter 5, sees quality in part as being a description of the conative values i.e. the goals to be achieved in terms of practical, moral, intellectual and aesthetic values.

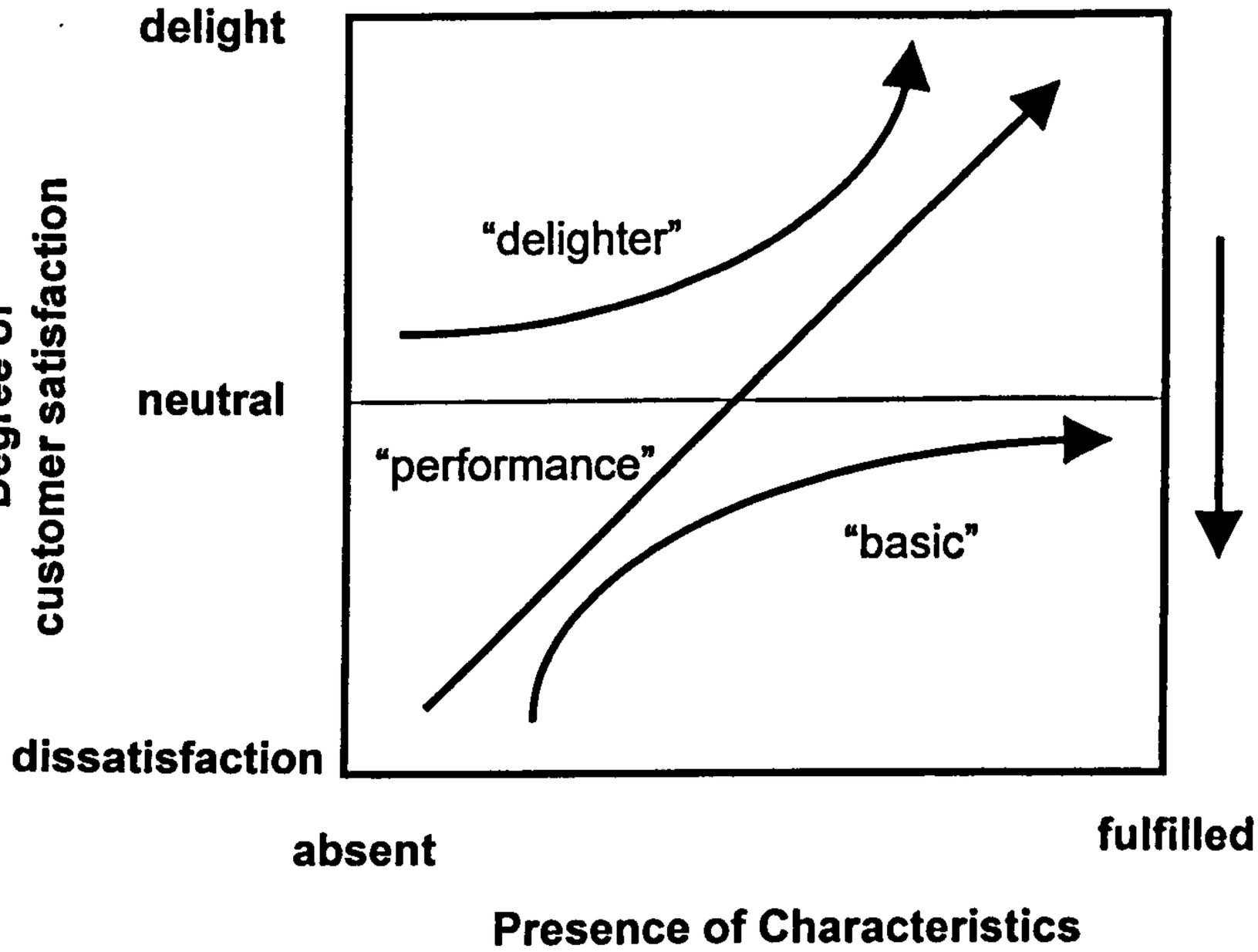


Figure 6.2 The Kano model (adapted from Bicheno: 2000)

Pirsig (1991 p137) quotes Kant's "Critique of Pure Reason" in describing quality as being determined by means of the senses as illustrated in figure 6.3. The five senses of touch or feel, see, smell, hearing sound, and taste lead to an individual perception of personal awareness relating to safety, security, comfort, relaxation, performance/excitement and delight. It is these that enable each individual to judge quality. In the synthesis of the quality continuum, the quality matrix and the Kano model, it is deduced that quality is personal and is related to the stimulation of the senses.

For the purposes of this research quality is defined as the degree to which stated objectives, characteristics and/or attributes have been met. This is often associated with a degree of excellence, and is the provision of all basic functions at the required level and all performance functions at the highest level. Delight functions provide the added value. Quality is a construct of comparability.

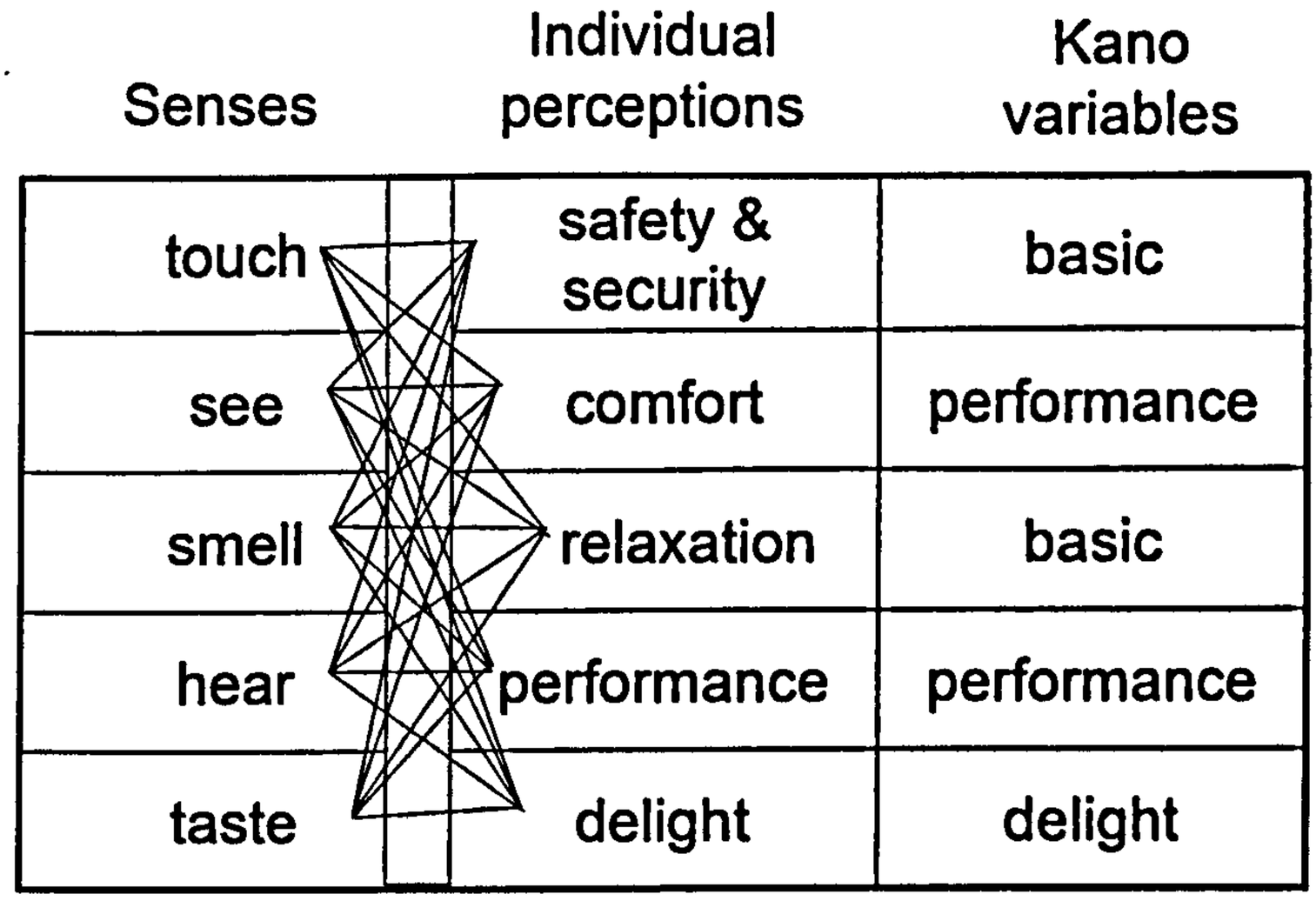


Figure 6.3 The Quality Matrix

6.03 Quality systems

There are two categories of quality systems, Total Quality Management and Quality Assurance. Total Quality Management is described as the synthesis of the organisational, technical and cultural elements of an organisation expressed in the attitudes that pervade the management culture in the provision of the highest level of excellence in products and/or services. Quality Assurance is the management of defined, consistent, standards of products and/or services (Vorley: 1998). Quality Assurance necessarily requires an understanding of the performance capability in the production of products or delivery of services, the setting of standards, the measurement of performance and the means of remedial action. The relationship between total quality management and quality assurance is shown in figure 6.4. In the context of a construction project the design and construction team will be aware of the client issues of Total Quality Management but be less aware of Quality Assurance in the context of the client's products or services.

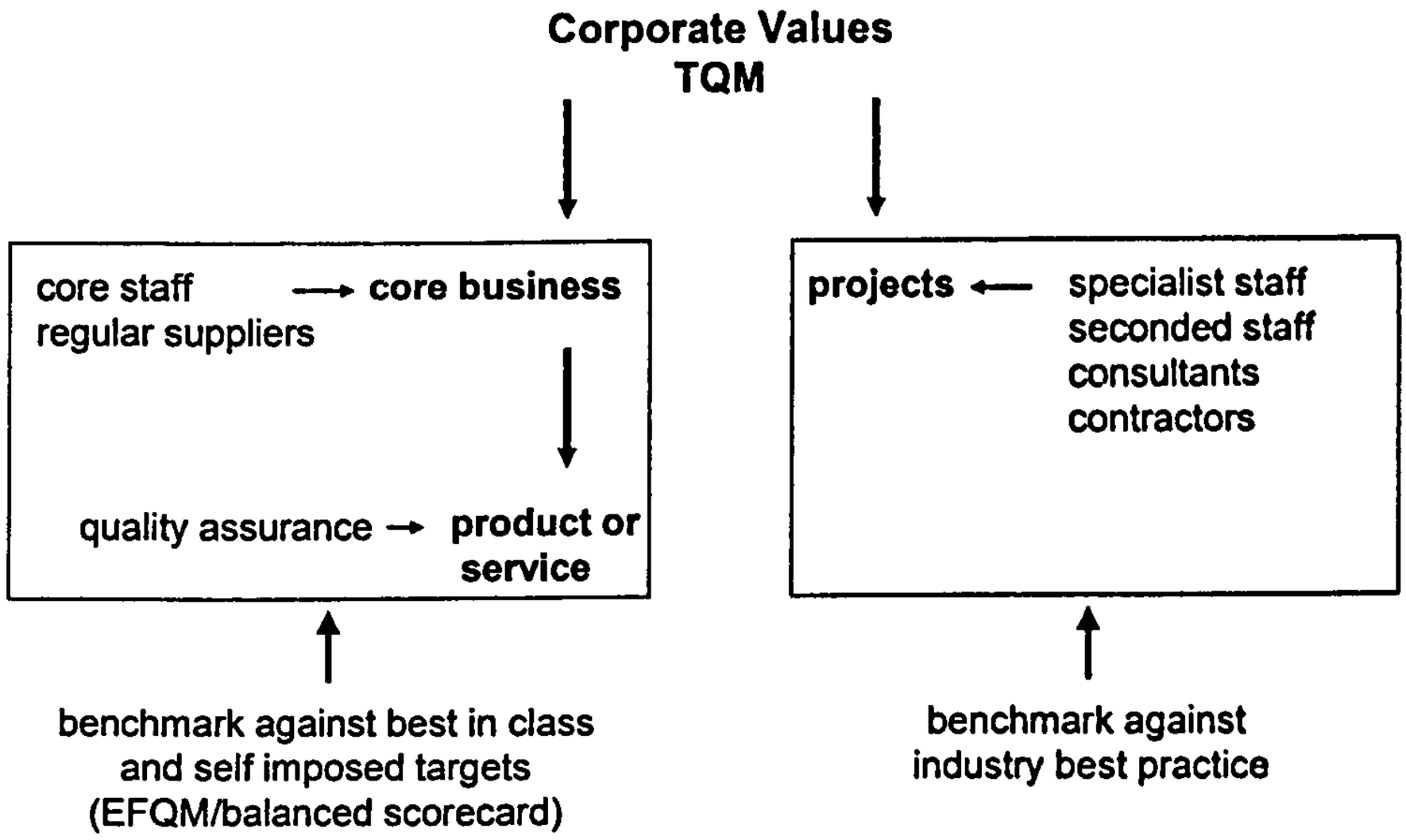


Figure 6.4 Corporate values permeate core business and projects

Corporate total quality management criteria, as illustrated in the EFQM model, figure 6.5, will have an impact on projects and therefore will influence the client value system as it is applied to projects. The projects themselves will be influenced by corporate TQM and indeed, since projects can be instigated by a quality failing, may have come about through a weakness discovered through the application of TQM. The weakness is most likely to be discovered through a failure to meet a key performance indicator.

By abstraction from the quality criteria, the raw data for a client value system could incorporate:

- Culture in terms of leadership, human resource organisation and policy.
- Organisational processes incorporating flexibility, agility, stability, etc
- A focus on the customer
- The organisational attitudes to society.

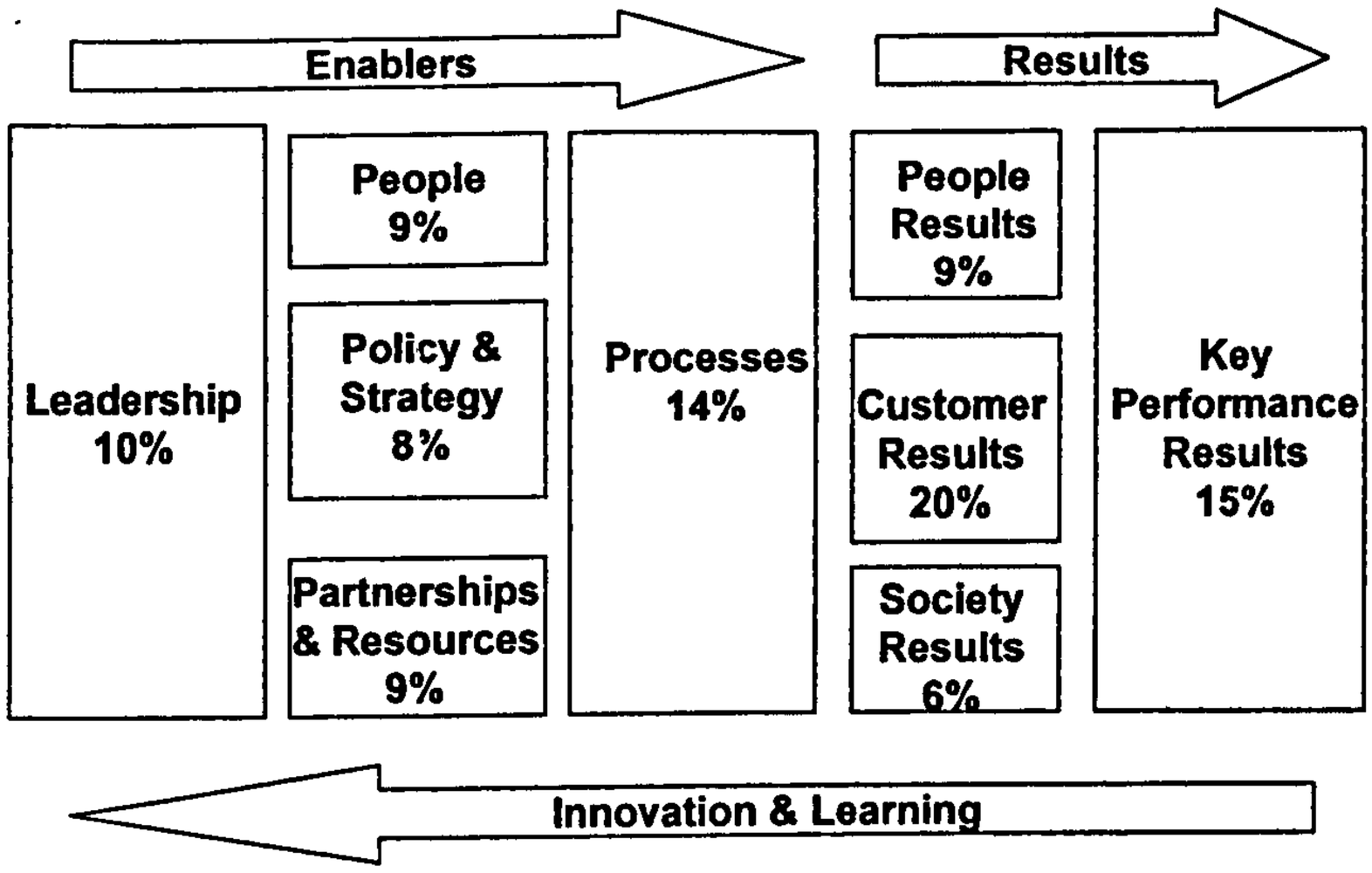


Figure 6.5 The EFQM Model (EFQM® and the model are registered trademarks of the European Foundation for Quality Management)

As reviewed in chapter 2 the most popular expression for value in value enginecring texts is, as a relationship between function and cost. Other texts reviewed refer to value as an algorithm with the variables of time, cost and quality. It is the later which is the more useful. The first client value system possesses the variables of time and cost although the later may be divided into capital cost (CAPEX) and operating cost (OPEX). Logically the remaining elements should be the variables of quality.

In the development of a client value system the variables of value are required to obey a number of rules. As determined by Zimmerman (2001) and reviewed in chapter 5, the basic intrinsic variables comprising the client value system should be proper parts of that value system, have no correlated parts, have actual intrinsic value and contain all the parts of the value system.

Additionally, to comply with the requirements of the quality definition, value is maximised when basic functions achieve their required level, performance functions are at the highest level and delight functions add to the goodness of the product or service. In the context of the client value system delight functions are a bonus and are therefore logically not specified.

Basic functions are those requirements which carry a precise specification. Failing to meet that specification even by a small amount will lead to dissatisfaction. Basic functions therefore fall outside of the area of discretion and will be included as a specification requirement and can not be a part of a value system.

Performance functions are those requirements which are perceived as having discretion and can give client satisfaction or pleasure at less than 100% fulfilment. At 100% fulfilment they are capable of achieving delight. Delighters are not specified and can delight even at low percentages of their potential. This is illustrated in figure 6.6.

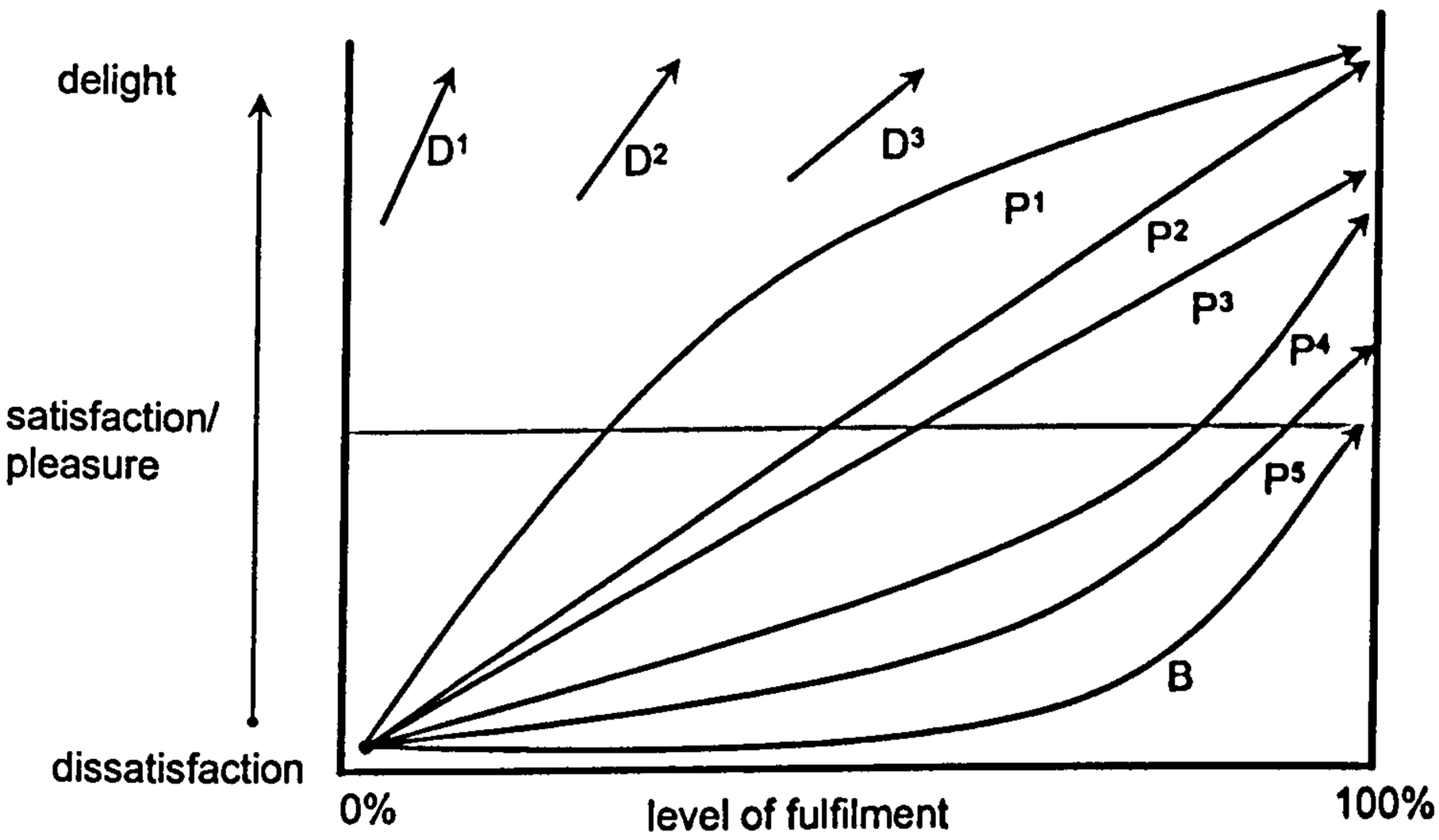


Figure 6.6 Basic (B) Performance (P^n) and Delighters (D^n)

Two issues must now be addressed by considering firstly, those variables which can be defined as performance or basic and secondly, the values of performance which lead to client satisfaction.

6.04 The basic and performance variables of a client value system

In the analysis of architectural design, Vitruvius (100BC: translated Morgan 1960) stated that the value system for architecture depends on order, arrangement, eurythmy, symmetry, propriety and economy. Kirk and Spreckelmeyer (1993) describe typical design objectives as being; the aesthetic, esteem or image, the concept of the building and the way in which the building attracts attention to itself. Functional efficiency and flexibility, is the degree to which the building is able to respond to the work process and flow of people, equipment and materials, be rearranged or expanded by the client to conform to revised processes and personnel changes with minimal disruption to existing building functions. Human performance is impacted by the physical and psychological comfort of the building as a place for working and living, supported by technical performance, how the building operates in terms of mechanical systems, electrical systems and industrial processes. Through life costs are described as the economic sequence of building in terms of long-term operating costs. Good neighbour issues cover the impact on the community, energy conservation and security addressing the degree to which the building can segregate sensitive functions from one another and prevent the entry of people to restricted areas. Kirk demonstrates the use of weighting design objectives as a methodology for highlighting the relative degrees of importance, or value priorities, of the various design objectives.

Thiry (1997) cites a later (1994) paper by Kirk and presented to the 1994 conference of SAVE International (at that time the Society of American Value Engineers). Thiry illustrates Kirk's quality model as a radar diagram comprising the following performance measures:

- Capital Cost
- O&M Cost
- Schedule
- Operational effectiveness
- Flexibility/expandability
- User comfort
- Site Planning image
- Architecture image
- Community values

- Engineering performance
- Security/Safety in operation
- Environmental

Best and De Valence (1999) emphasize the complexity of quality by listing for illustrative purposes 15 factors that may be subjected to a quality continuum. Davies et al (1993) describes sets of scales, published in a volume of over 300 pages, for setting occupant requirements and rating scales for office buildings.

In July 2002 (Architect's Journal 11th July 2002) the Construction Industry Council launched the Design Quality Indicator, which has significant similarities to Kirk above. The indicators are grouped under three headings as follows:

- Functionality
    - Use
    - Access
    - Space
- Build Quality
    - Performance
    - Engineering Systems
    - Construction
- Impact
    - Form and materials
    - Internal environment
    - Urban and social integration
    - Character and innovation
- Additionally the topics of finance, time, environment and resources are dealt with separately.

The Achieving Excellence (previously Construction Best Practice Panel) key performance indicators for benchmarking are:

- Construction cost
- Construction time
- Predicted design cost
- Predicted design time
- Defects

- Client satisfaction product
- Client satisfaction service
- Profitability
- Productivity
- Safety

The various key performance indicators and design issues indicated in the above lists are compared in Figure 6.8. Whether each performance indicator and design issue meets the criteria required of a valid contender for inclusion as a variable of a client value system is based upon the following:

1. A distinction is made between basic and performance variables. A basic variable is one in which there is a requirement to meet a specification at 100 per cent, there is no element of discretion. Safety is a basic variable, for example, a floor finish in a hospital may be specified as safe in a wet environment (non-slip). If a patient slips on the floor injuring themselves then clearly the floor was unsafe. The test is whether the designer, in answering the client's specification, can delight the client. A designer providing a level of safety beyond that which was specified will be unable to delight the client. A performance variable is one where the client has discretion and the designer has the opportunity to delight.

2. KPI's and design issues which address performance are those with elements of discretion and are capable of delighting the client. For example, the client has discretion on the amount to be spent on the capital cost of the project. If the design and construction team bring the project in under budget the client will be delighted. Similarly the client has discretion on whether the project will meet a particular "green" agenda. If the design and construction team present a building which exceeds the client's environmental aspirations then the client will be delighted. The discretion on the part of the client and the opportunity for the design and construction team to delight, separate specified basic criteria from those which are contenders for inclusion as variables of the client value system.
3. The client value system must be comprised of variables which are not correlated (Zimmerman's rules). This rules out large inclusive variables such as fitness for purpose and KPI's such as client satisfaction.

4. The client value system must exclude specification of factors which it is attempting to influence. The efficiency of the building expressed in terms of the arrangement of space, the durability of components, the reliability of service, etc are outcomes of the client value system and are not a part of it. Order, arrangement and the efficiency in the distribution of the specified space is a later stage involving the application of the designer's skill. The application of that skill will delight the client if the designer is able to undertake the design task in accordance with or exceeding the client value system.

5. In the context of Saaty's hierarchy what is being sought for the client value system are those variables which lie at the same (highest) level.

6. The final test of variables to be included in the client value system is the extent to which they can be the subject of a continuum against which the client can indicate the satisfaction point. This is illustrated in figure 6.7 with reference to the variable "time" highlighted by most of authors cited. Time in this context would be defined as the time from the current stage in the project until the receipt of service or handover of the building. The continuum would extend from, "time is of the essence" i.e. one day late would be the cause of dissatisfaction; to "time is at large" i.e. the project is expected to be completed within reasonable time.

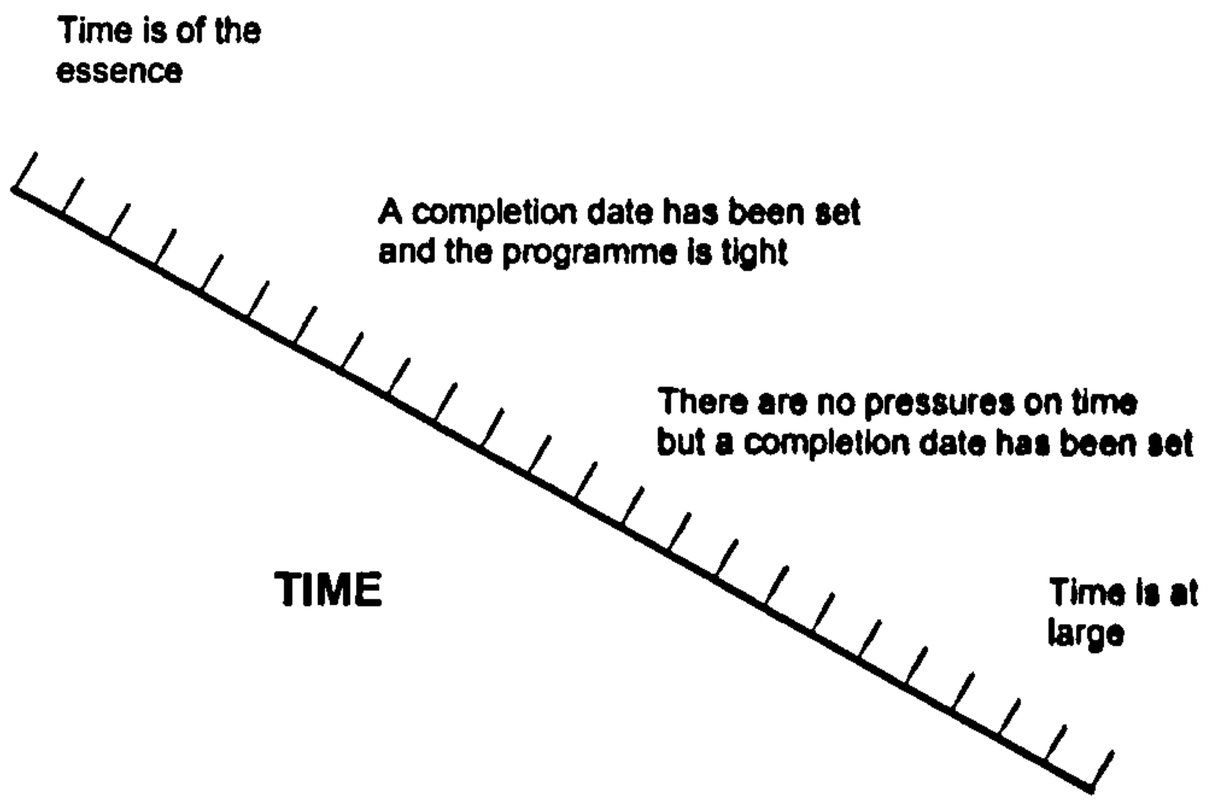


Figure 6.7 The time continuum

Vitruvius	Kirk	Best and De Valence	DQI	AE/CBPP	Phase 1	Comments
Economy	Capital cost		Finance	Cost	Cost	Meets criteria
	Operating cost	Minimum OPEX				Meets criteria
	Schedule		Time	Time	Time	Meets criteria
Order						Post CVS design task
Arrangement						Post CVS design task
Eurythmy	Esteem	Uniqueness	Character		Esteem	Meets criteria
Symmetry	Efficiency					Post CVS design task
	Flexibility	Flexibility				Meets criteria
	Comfort	Comfort				Meets criteria
	Internal Env	Eng services	Int environment			Correlated with comfort
Propriety	Community		Community			Meets criteria
	Security	Security				Specified basic requirement
	Safety			Safety		Specified basic requirement
	Environment	Environment	Environment		Environment	Meets criteria
		Fit for purpose	Fit for purpose		Fit for purpose	Specified requirement
		Site				Specified location

		Durable				Correlated with OPEX
		Financial return			Exchange	Meets criteria
		Weatherproof				Specified requirement
			Quality		Int & ext quality	Too inclusive
				Defects		Workmanship issue
				Satisfactn prod		Too inclusive
				Satisfactn serv		Too inclusive
				Profitability		Not relevant to value/quality
				Productivity		Not relevant to value/quality

Figure 6.8 Analysis of contender variables for the client value system

6.05 Summary of the proposed variables of client value

Based upon the analysis in table 6.8 the following criteria are those which are not in any way correlated, are not too inclusive, impact all areas of design and are subject to a continuum against which a measurement assessment of client satisfaction can be made.

1. Capital cost (CAPEX) are all costs associated with the investment costs of the project, measured on a continuum between the budget being considered tight and can not be exceeded to there is flexibility in budgeting.

2. Operating cost (OPEX) refers to all costs associated with the operations and maintenance implications of the completed project as it moves to an operational product within the client's core business. The continuum is between OPEX must be at a controlled absolute minimum to there is some flexibility in operating cost.

3. Time: the time from the present until the completion of the project, the point when the project ends and is absorbed into the core client business. Time can be assessed on a continuum from time is "of the essence" to time is "at large".

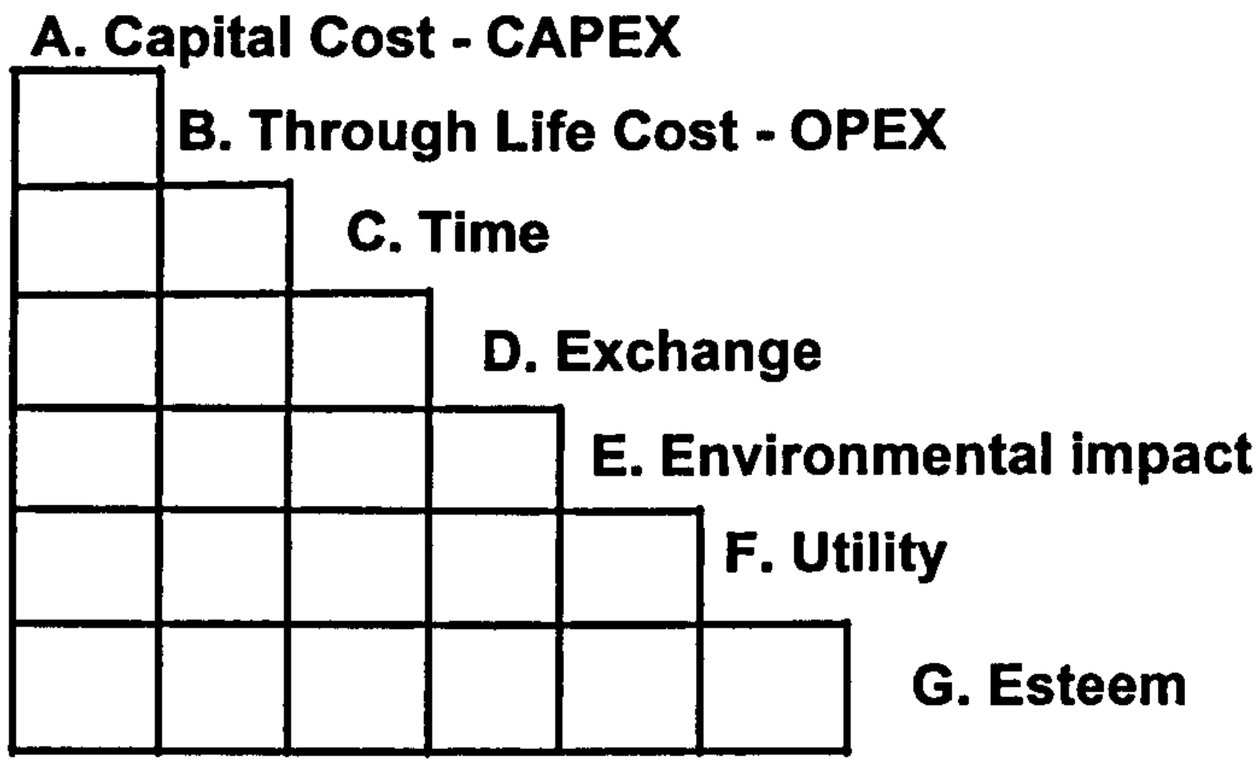
4. Exchange or resale is the monetary value of the project. This may be viewed as assets on the balance sheet, the increase in share value, capitalised rental or how much the project would realise were it to be sold. The continuum is between maximum return and return is of no consequence.

5. Environment refers to the extent to which the project results in a sympathetic approach to the environment, measured by its local and global impact, its embodied energy, the energy consumed through use and other "green" issues. The continuum is between maximum observance of Kyoto and Agenda 21 issues to indiscriminate sourcing policies and solving every environmental problem by adding more power.

6. Utility refers to the provision to meet the projects requirements and is expressed on a continuum from the absolute minimum provision to the point where luxury is encountered

7. Esteem is the extent to which the client wishes to commit resources for an aesthetic statement or portray the esteem of the organisation, internally and externally. The continuum is between we need to attract admiration to esteem is of no significance.

The refined model for testing is shown in figure 6.9.



A	B	C	D	E	F	G	
							Total

Figure 6.9 Paired comparison client value system matrix

6.06 The client value system and value chains in construction

In chapter 5 case study 2 is described in which the full team contributed to the client value system. This caused concern as it was felt by the two facilitators present that there were three distinct groups putting forward a view, the client headquarters team, the client local operational team and the consultant designers. The local councillor and representative of the local community did not contribute. Arising from the first

experiment the questions to be considered from the perspective of stakeholders of construction projects are:

- Does each member of the supply chain contribute to the project value system or is the client value system adopted by all stakeholders to construction projects?
- Do individuals influence the value system by overlaying their own culture and beliefs onto the project?
- Does the client value system become modified as the project proceeds through its developmental stages as different individuals become involved?
- Is the client value system a restatement of the corporate values expressed through the public face of the client corporate organisation?

Supply chains, value chains and the project value system

Porter (1985) developed the concept of the value chain as a tool for diagnosing commercial competitive advantage. In the manufacturing firm, activities within the firm are supported by the firm's infrastructure and described as: inbound logistics, operations, outbound logistics, marketing and sales, and service. A number of firms contribute to the process from the mining of the raw material, to the sale of the finished product to the customer. Each firm is a member of the supply chain and adds a discreet amount of effort, termed by Porter - value. Therefore, Porter's value chain can be established by reference to the added value by each member of the supply chain. As each activity within each firm has the potential for differentiation then, Porter argues, competitive advantage can be made explicit through the analysis of each activity within the value chain. In this analysis the product is desired by the customer based upon criteria determined by the customer. Porter proposes that if the product desired by the customer can be produced at least cost, through the focus on the value chain, then a competitive advantage can be achieved for the product.

Standing (2001) interprets Porter's value chain in the context of construction focusing on the construction project in place of the manufactured product. Standing analyses the construction project value chain and concludes that it comprises:

- Corporate value
- Business value
- Feasibility value

- Design value
- Construction value
- Commission value
- Operation value

Standing states that the project value chain passes through a number of value systems and phases illustrated in figure 6.10 and described as;

- the client value system influencing the strategic phase of the project
- the multi-value system influencing the tactical phase of the project
- the user value system influencing the operational phase of the project.

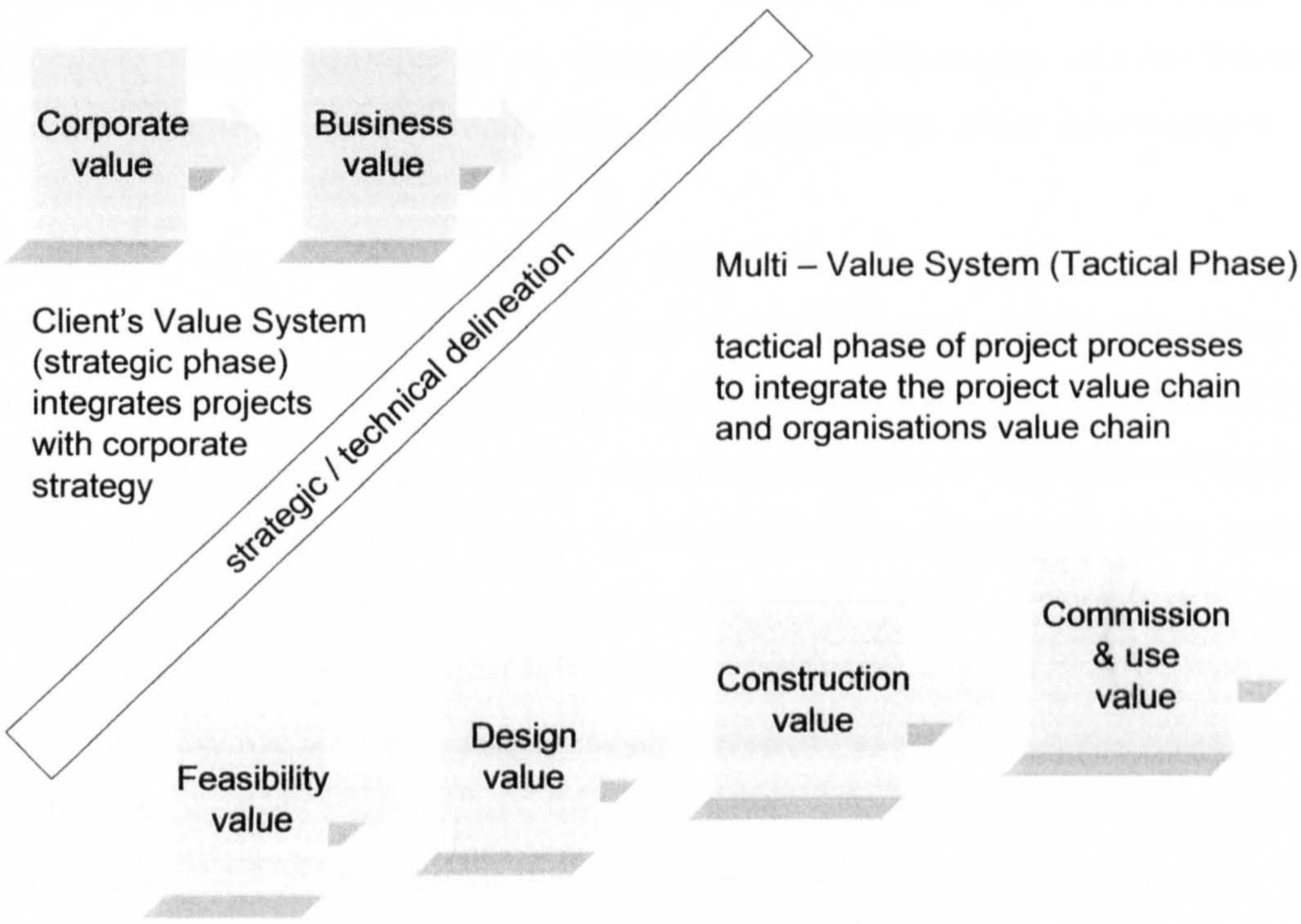


Figure 6.10 Strategic and Tactical Phases (adapted Standing 2001 p8)

The strategic phase incorporates the corporate value criteria used to differentiate between a portfolio of competing projects and the business value criteria used to assess the investment required, the resources available, and the desired return on investment. The strategic value system of the client becomes operational at the point that a project is identified and adopted. The strategic phase is followed by the tactical phase the first stage of which is feasibility. Feasibility is the point where the necessary resources are

assembled for the project, principally the design and construction team. Standing (2001 p10) states

> "feasibility value can be seen as the balance of the time, cost and quality equation within the context of the functionality of the project. The client, through the value chain, must have considered the implications of time, cost quality and functionality of the project. These four items are objectives that have been translated from the strategic phase. At what point the client value chain fits within cost time and the quality triangle needs to be made clear to the other organisations operating within the multi value system".

Standing's work raises the issue of a difference between project management control functions, the responsibility of the design and construction team and the functionality issues which bear upon the contribution of the project to the client core business.

Atkinson (1999) reinforces Standing's work in a discussion of the adequacy of the project management control focus on time, cost and quality which he describes as two guesses and a phenomenon. Atkinson quotes Alter (1996) who differentiates between the project management process and organisational goals as two different measures of success in which the former focuses on the production management of the project and the latter on the functionality of the project to the client. In concluding Atkinson proposes a "square route" in which the time, cost quality triangle is supplemented by three other control functions namely, an information system, the explicit benefits of the project to the client organisation, and the explicit benefits required by the stakeholder community. Atkinson does not define the stakeholder community but implies that this is the design and construction team as defined by Standing.

In earlier work Bell (1994) concludes that the assumption that value within the client organisation, the client value system, would hand over control to the multi value system of the project was too simplistic. In reality for the client value system to be clear for all to see during the progress of the project called for strong communication and leadership as reinforced by Atkinson (1999). Bell describes that this could be achieved through the management of a "value thread". Bell illustrates in figure 6.11 that the client value system is seen to extend through the project having the most influence in the early

stages but being supplemented by the multi value system of the participants until the handover of the project when the client value system becomes re-established.

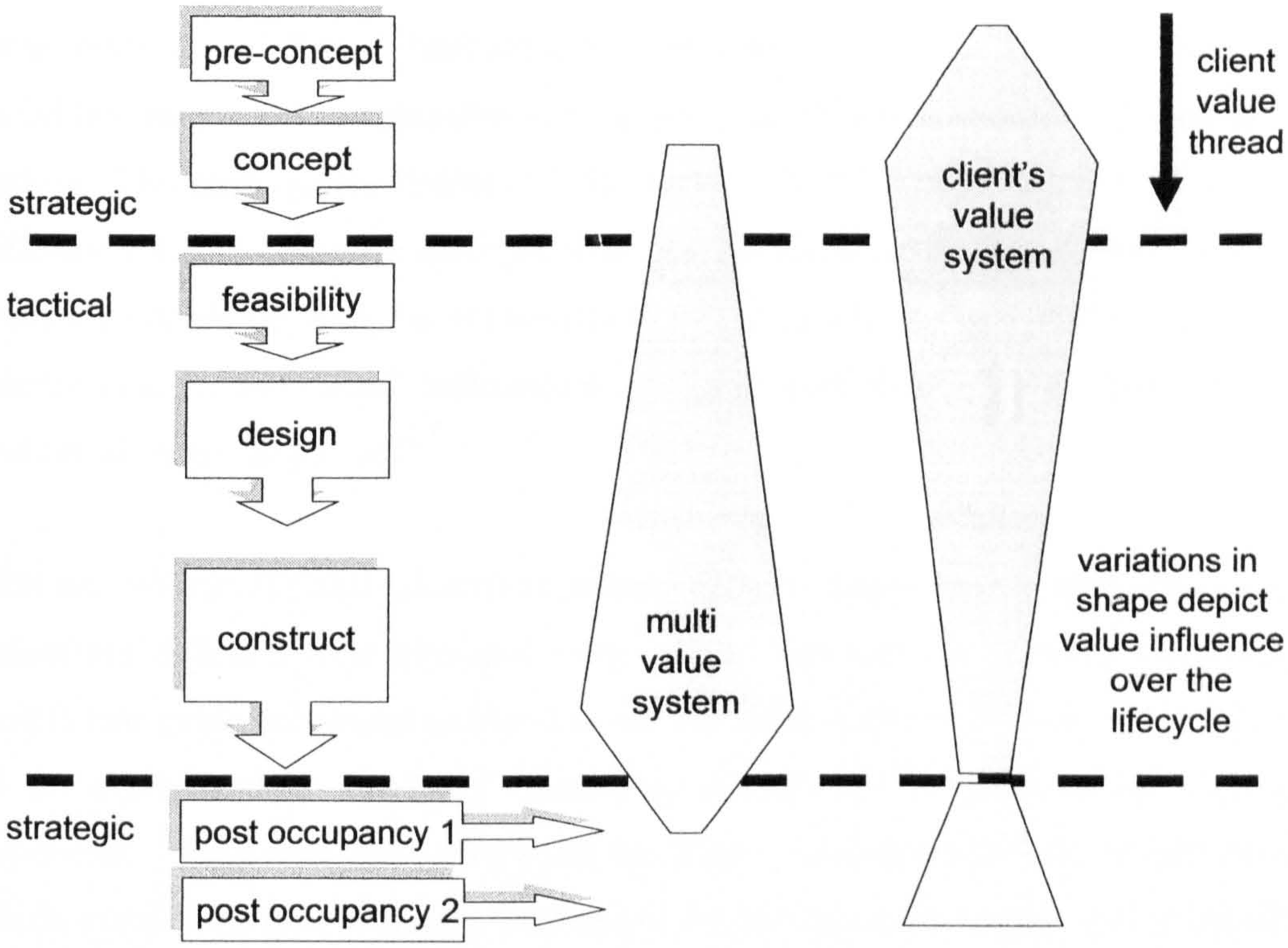


Figure 6.11 The Client Value System (After Bell 1994: p287)

Bell's term, the value thread is a useful metaphor because it exemplifies the fragility of the client value system permeating through those elements of the (robust) value chain. The value thread can be easily broken particularly where the value chain links between elements of the project is missing or tenuous. The concept of the value thread flowing from the client organisation and describing time, cost, quality and functionality in the context of core business is answered by the supply chain through value chain activity. The first question "Does each member of the supply chain contribute to the project value system or is the client value system adopted by all stakeholders to construction projects?" is answered. The client value system is the value thread and is answered by the supply chain in the provision of goods and services to best value in the context of the client value system. The supply chain does not contribute to the client value system.

Personal and Corporate Values

Thomson et al (2003) concludes that the common values influencing the development of the project emerge from a process of negotiation between stakeholders who often have markedly different backgrounds and objectives and in this negotiation an individual may need to subordinate their personal values to those of the project value system. Thomson quotes Najder (1975) that an individual might operate within several different value systems for example religious, political, economic, etc. that may not be precisely correlated with the value criteria of the project. This reinforces the second question i.e. Do individuals influence the value system by overlaying their own culture and beliefs onto the project?

Flint and Woodruff (2001) describes research into customer values stating that customer values are different from personal values which are abstract, centrally held, implicit beliefs that guide behaviour and tend to remain fairly stable over time. Customer value on the other hand is constantly developing through the influence of knowledge and experience. Flint uses the example of the motor car industry of the United States in which customers were strongly influenced by the apparent quality and reliability of Japanese imports. Manufacturers are influenced by what Flint describes as tension drivers, defined as changing external customer demands, changing internal organisational demands, competitor repositioning, changing supplier demands and macro environmental change. Therefore whilst personal values remain stable over time customer and organisational values will respond to the commercial or social world displayed at a given point in time.

Dumond (2000) largely supports Flint by stating that customers will be satisfied if the product or service provides them with value. Dumond defines customer value as those matters linked to the use of a product or service, thereby differentiating between customer values and personal values. In this context value is not objectively determined by the seller but determined by the customer and typically involves a trade-off between what the customer receives e.g. benefits, quality, worth and what is given up to acquire and use the product or service i.e. payment or other sacrifice. Dumond states that in the management of value it is necessary to distinguish between price and worth where price is assigned to goods and services by the seller to attract the customer whereas worth reflects the customer's view of the perceived benefits of the product or

service. The question then arises as to how the value criteria of the customer are explained?

Fischhoff (2000) concludes that an explicit statement of well differentiated values is likely only for the most familiar of evaluation questions about which an individual or organisation has had an opportunity by trial and error or reflection to develop a fixed opinion. This would be the case for example, for the corporate mission statement included in a company's annual report but unlikely in the case of an individual asked on the street for their value system. Therefore, unless an individual or an organisation has previously been in the situation where it has been necessary to articulate a value system then the formulation of such a system will be problematic although Fischhoff states that an explicit value system may be derived by inference from an analogy. The formulation of a value system is conducive where there is; the time and motivation to think, to hear and share views, where the consequences of its expression are clear, the need to justify oneself and the likelihood of consequent conflict is minimal, where the form of expression is familiar and meaningful, and where its expression is directly related to an action. These rules are useful in the context of formulating a value system for a construction project.

Woodhead (1999) refers to his PhD research in the definition of paradigms and perspectives. A paradigm is defined as rules, codes of practice and peer expectations identified as belonging to a particular organisation, social institution or profession, central to which is a collective belief system based on concepts of value. Within paradigms, perspectives or alternative views of individuals or identified groups fight for dominance. This internal conflict takes place as the paradigms themselves fight for dominance against other paradigms. Woodhead concludes a study of large construction projects in the United Kingdom by stating that a capital investment paradigm and cost-benefit analysis paradigm influence the process by which decisions were shaped and evaluated. The capital investment paradigm is described as being dominated by shareholder expectations, the return on investment and investment finance. Other paradigms such as the marketing and planning permission paradigms compete for dominance and play an important role in influencing the decision to build process. The paradigms and perspectives fight for overall dominance of the group decision-making agenda through the values and expectations of people.

The answer to the question "do individuals influence the client value system by overlaying their own culture and beliefs onto the project?" is no. Individuals operate within their own culture, beliefs, attitudes, and opinions and these permeate thinking, guide behaviour and tend to remain fairly stable over time. However, the public face of the individual and the value system used in the selection of goods and services is constantly developing through the influence of knowledge and experience, linked to the use of a product or service, and focused on the trade-off between what the customer receives e.g. benefits, quality, worth and what is given up to acquire and use the product or service i.e. payment or other sacrifice. The corporate client value system is an amalgam of the perspectives of individuals and groups within the client organisation developing appropriate paradigms for particular project developments.

Summary

The views of Woodhead (1999), Flint and Woodruff (2001), and Dumond (2000) on the position of the individual purchasing a product is summarised in figure 6.12.

The individuals' culture, beliefs, attitudes and opinions, the sort of factors considered by Mazlow (1943) and Rokeach (1973) influence individual decision-making but in the context of purchasing, other factors come into play for example the availability of finance, the availability of time and previous experience and/or knowledge. The individuals value criteria or, the public face of the individual is only that visible and relevant to the purveyor of goods and services. In reviewing the required product or service the individual will determine the extent to which the offering matches the individual's requirement and value system. Simplistically, a clear match between the product and requirement plus the value system, will result in a buy decision and mismatch will result in a not to buy decision.

This logic is mirrored by the corporate situation in which corporate culture impacted by resources, knowledge and the requirements for return on investment are hidden within the client organisation. The client corporate is made up of a large number of individuals who have their own perspectives and will be influential in the formation of the various paradigms within the client organisation. A decision to purchase a product or service will depend upon a match between a requirement and the value system of the corporate customer. Supply chain activity to produce the required product will be based on an

analysis of the customer's requirements and the meeting of those requirements at the lowest cost. This concept is illustrated in diagram 6.13

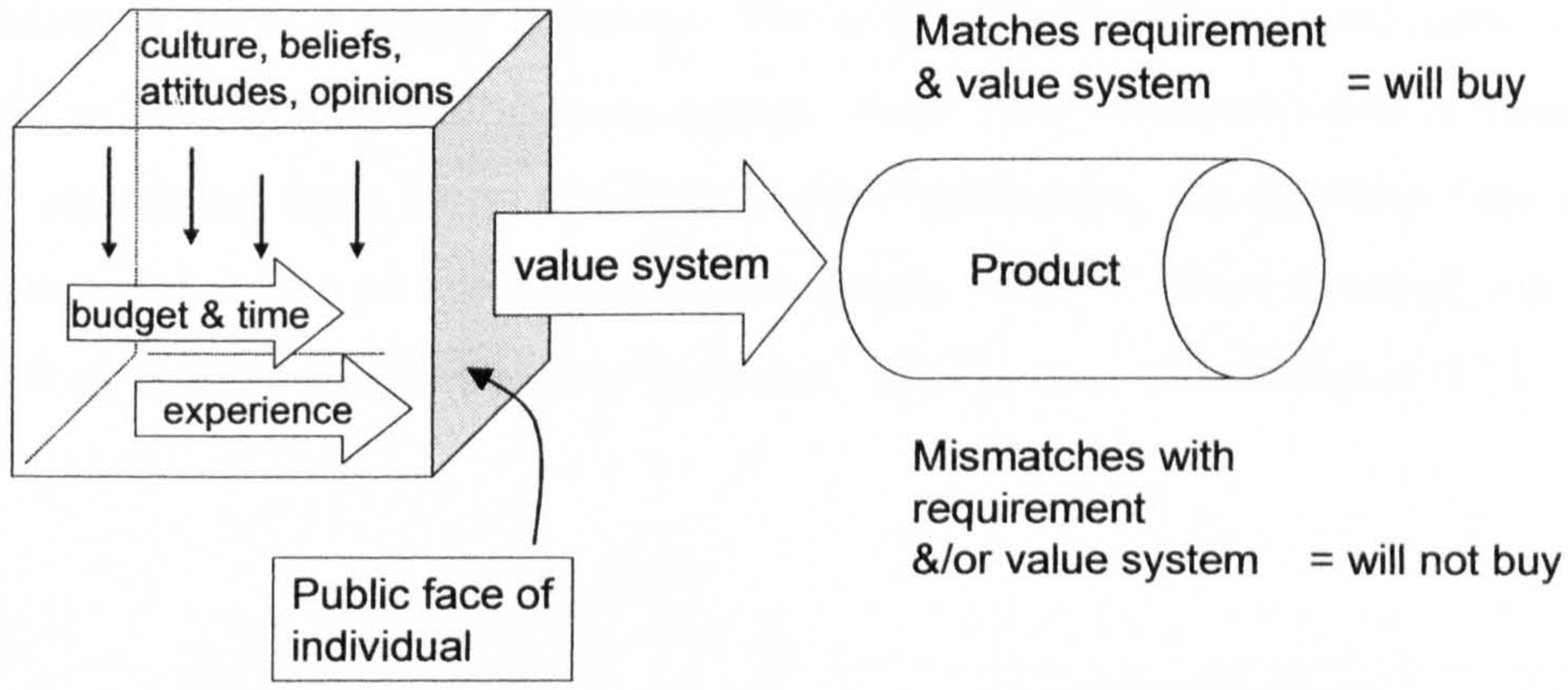


Figure 6.12 Individual's decision to purchase

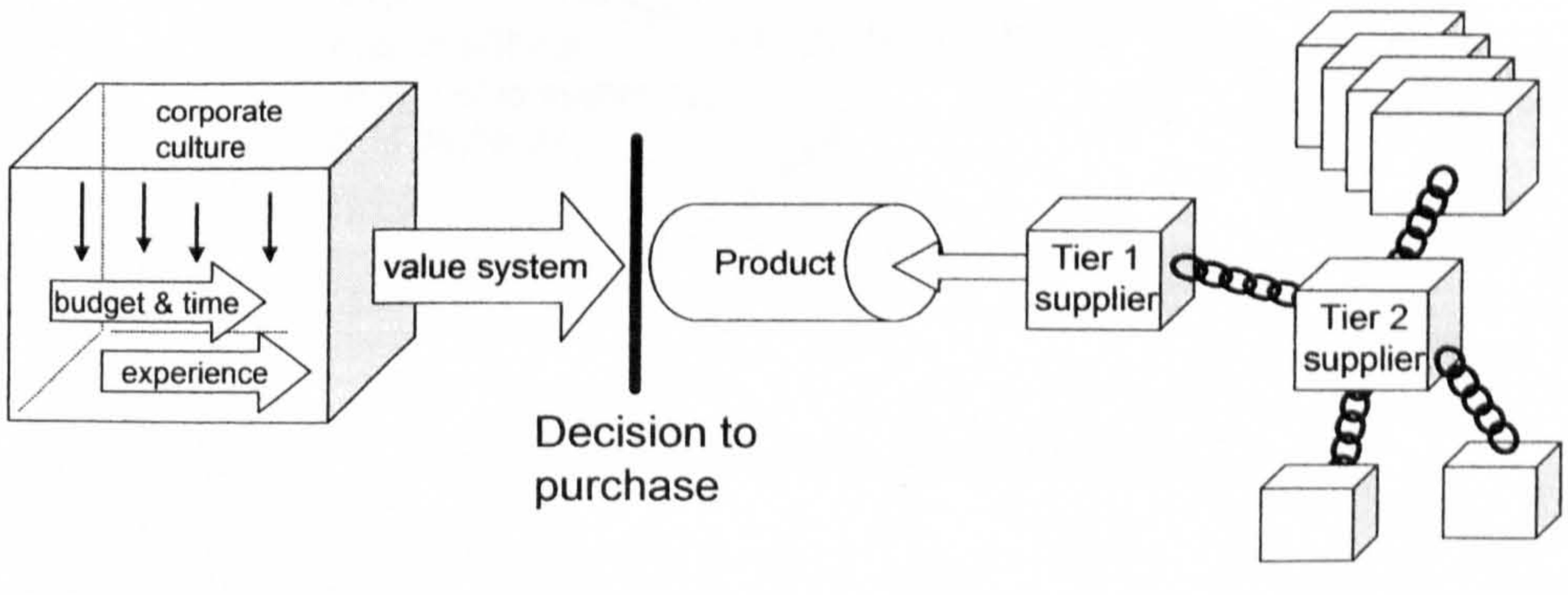


Figure 6.13 Corporate decision to purchase

In the context of a construction project inspired by a corporate client the situation is more complex. It is not simply the matching of a requirement and a value system but the specification of the situation under which that project is to be carried out. As previously discussed, the internal perspectives and paradigms of the client organisation operate identically to the situation in which the client wishes to avail themselves of a product or service supply offering. The corporate client's core business will also be clear as well as the core business output. Front face corporate value is clearly seen as that emanating from the public face of the organisation. On the back face will be the commercial values as understood by the supply chain involved in supplying goods and services which contribute to core business. This is illustrated in figure 6.14

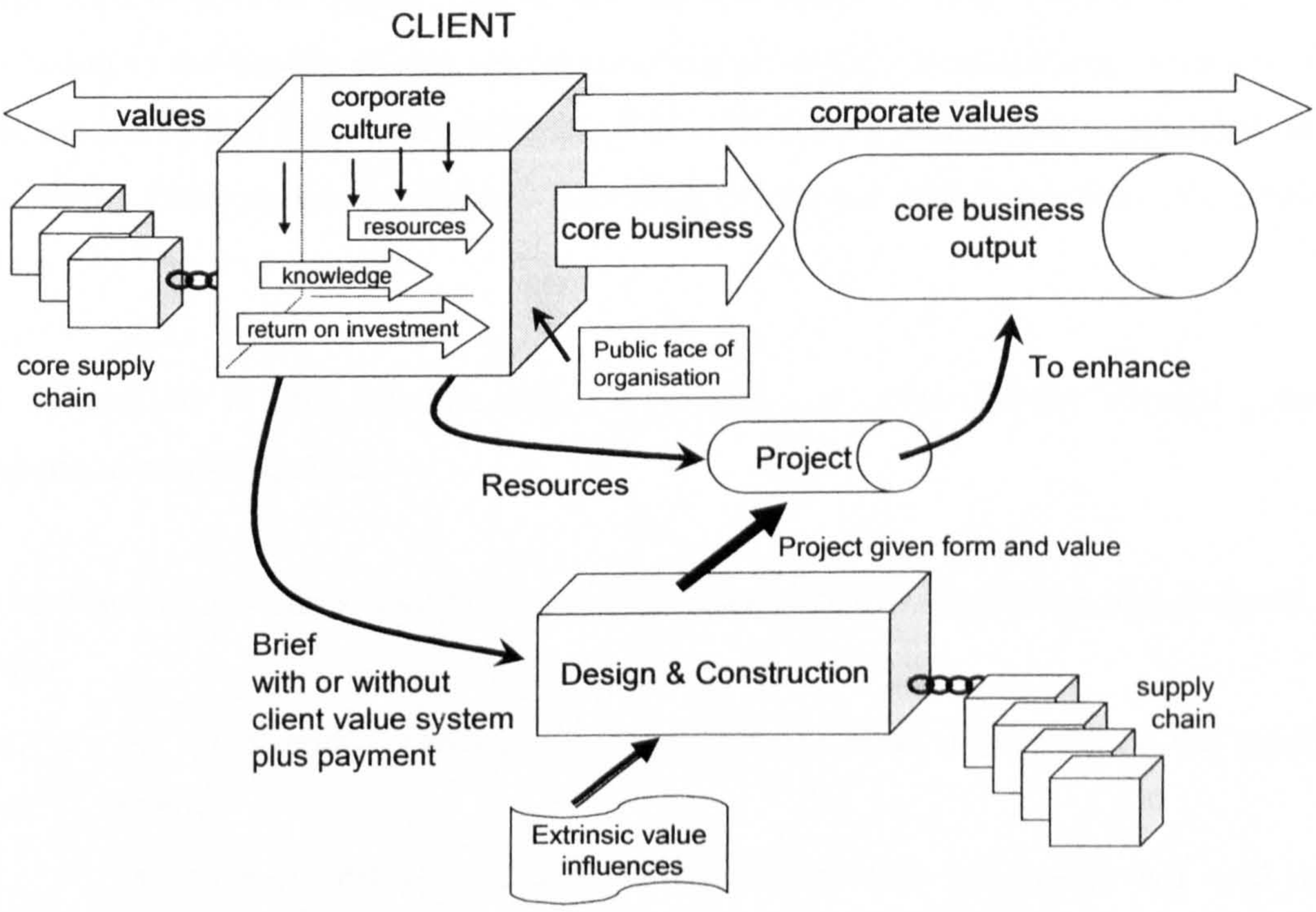


Figure 6.14 Corporate decision to build

In the event that the client wishes to invest in a project to enhance core business, a different set of circumstances arise to those where the client is to purchase a product. The client must evolve a brief which will exist with or without a clear description of the value system of the client. The brief will be handed to a design and construction team who will develop, using their own professional and technical expertise a solution to the project. The project will thereby be given form and effectively value. In the absence of

a client value system the design and construction team will be influenced by their interpretation of the clients corporate values. The design and construction team will also be influenced by extrinsic values such as those relating to esteem and environmental issues. The project will attract these values whether or not an explicit client value system has informed them. It is argued here that it is better if an explicit client value system does inform those values by which the project will be developed and assessed.

6.07 Summary

This chapter has widened the debate from that addressed in chapter 5 to include a discussion of quality, the relationship of key performance indicators and the components of a value system and finally has addressed the supply chain issues. The conclusion to the quality debate can be summarised in the criteria for the variables of a value system within those that are the subject of discretion and can be represented on a continuum. Basic requirements at a specified level are not included as part of the value system.

The conclusion to the identification of variables is given in the revised paired comparison model figure 6.19

The answers to questions relating to the individuals contributing to the value equation are that;

- the client makes explicit the value system which is adopted by the supply chain;
- individuals own culture and belief systems will be present but will not unduly influence the corporate paradigms of which the client value system is comprised;
- the client value system is fixed and will not be modified as it threads its way through the developmental stages of the project;
- the corporate value system emanates from the public face of the organisation however, the client project value system will be derived from the inner core of the organisation reflecting the outcomes of the perspectives and paradigms of internal stakeholders. In the absence of an explicit project

based value system it is the corporate value system which will be adopted by the construction supply chain to give the project its value.

The conclusions drawn from each of the three discussions are carried forward to the next stage of the action research.

6.08 References

Alter, S 1996, *Information Systems: a management perspective*, 2nd edition ed Benjamin and Cummings, California (from Atkinson)

Atkinson, R 1999, Project Management: cost, time and quality, two best guesses and a phenomenon, its time to accept other success criteria, *International Journal of Project Management* Vol 17 No6 pp 337 – 342,

Bell, K L 1994, *The strategic management of projects to enhance value for money for BAA plc* PhD thesis Heriot-Watt University September 1994 pages 284 – 288.

Best, R and De Valence, G 1999, *Building in Value: Pre-Design Issues*, Arnold.

Bicheno, J 2002, *The Quality 75: towards six sigma performance in service and manufacturing* Picsie Books

Bicheno, J 2000, The Lean Toolbox, 2nd Edition, Picsie Books

Davies, G, Gray, J and Sinclair, D 1993, *Scales for Setting Occupant Requirements and Rating Buildings*, International Centre for Facilities, Ottawa

Dumond, E J 2000, Value Management: an underlying framework, *International Journal of Operations and Production Management* Vol 20, 9, pages 1062 – 1077.

Flint, D J and Woodruff, RB 2001, The Initiators of Changes in Customers Desired Value: results from a theory building study, *Industrial Marketing Management* Vol 30, 321 - 337.

Fischhoff, B 2000, Value Elicitation: is there anything in there? in *Choices, Values and Frames* edited Kahneman, D and Tversky, A, Cambridge University Press, Cambridge. Pages 620 to 641.

Juran, JM and Gryna, FM 1988, *Juran's Quality Control Handbook* 4th edition McGraw-Hill

Kirk, S J and Spreckelmeyer, K F 1993, *Enhancing Value in Design Decisions*

Maslow, A 1943, A theory of human motivation. *Psychological Review,* Vol 50, 370-396. retrieved Sept 2005, from http://psychclassics.yorku.ca/Maslow/motivation.htm

Najder, Z 1975, *Values and Evaluations*, Clarendon Press, Oxford, (from Thomson DS)

Perry, RB 1914, The Definition of Value *The Journal of Philosophy, Psychology and Scientific Methods*, Vol 11 No 6 (Mar 12), 141-162

Pirsig, RM 1991, *Zen and the Art of Motorcycle Maintenance*, Vintage

Porter, M E 1985, *Competitive Advantage* The Free Press New York chapters 2 and 4

Rice, PB 1943, Quality and Value, *The Journal of Philosophy,* Vol 40 No 13 (Jun 24), 337-348

Rokeach, M. 1973, *The Nature of Human Values*. Free Press New York

Standing, N A 2001, *Value Management Incentive Programme: innovations in delivering value* Thomas Telford London Chapter 2

Thiry, M 1997, *Value Management Practice* PMI Publications

Thomson, D S, Austin, S A, Devine-Wright, H and Mills, G R 2003, Managing value and quality in design, *Building Research and Information* Vol 31 (5), September - October, 334 - 345.

Vitruvius, Morgan MH 1960 *Vitruvius: the ten books on architecture*, Dover.

Vorley, G 1998, *Quality Management (principles and techniques)* third edition Quality Management and Training (Publications) Ltd.

Woodhead, R 1999, Recognising Value Analysis, Value Engineering, and Value Management in the context of a Value Ecology *Value World* Vol 22 No.3 Fall, 2 – 5.

Woodhead, R M 1999, *The Influence of Paradigms and Perspectiuves on the Decision to Build Undertaken by Large Experienced Clients of the United Kingdom Construction Industry* unpublished PhD thesis University of Leeds 1999.

Zimmerman M, (2001) The Nature of Intrinsic Value, Rowman and Littlefield.

Chapter 7 Action Research Studies

7.01 Introduction

This chapter describes 11 action research experiments on 9 projects during which the theories advanced in chapter 6 were tested on projects either in the strategic brief, project brief or immediate post brief stage. The studies are described chronologically and outline improvements and greater understanding in the operation of the model. In all cases the agenda for the workshop, including the client value system matrix, was described to the client prior to undertaking the exercise. Due to the confidential nature of the studies the identity of the projects has been withheld but a thumbnail sketch of each project is given to give context to the model.

7.02 Project 1 - regional distribution centre for a national brewery

The regional distribution centre is sited adjacent to a motorway on the outskirts of a Scottish town. The project catalyst from the perspective of the client's core business was to rationalise distribution within the central belt of Scotland. The distribution centre was to be on stream prior to the closure of an existing centre the date for which had been set.

Procurement:	Two stage tendering leading to negotiated lump sum design and build contract.
Workshop timing:	Immediately following the successful first stage – VM commission by contractor.
Design by:	Consultant architects and engineers to be novated to contractor.
Design stage:	Outline sketch design – discussions had been held with the planning officer but no planning permission had been given.
Primary issues at the workshop:	Programme, the completion date, the communication of information, planning consent and the date of design freeze.
Attendees:	Client's director for logistics (appointed project manager for this project). Consultants: architects (2) and an engineer Contractor: regional director, quantity surveyor, estimator, the prospective site agent and site engineer, contracts manager, and the programme manager. Facilitator and recorder (recorder from contractor)

Figure 7.1 – Thumbnail sketch of Regional Distribution Centre project

The client value system matrix was used in the workshop as a knowledge transfer tool between the client, designers and contractor. Following the debate in chapter 6 the rule that only the client was allowed to address the paired comparison questions was made explicit to the workshop team. During the questioning of the client's director for logistics there was some questioning by members of the designers and contractors team focused on elucidation only. The primary message from the exercise was the importance of time in the project, the minimisation of through life cost and maximisation of utility. The lack of importance of capital cost arose from the fact that the building was to be the subject of a leasing contract.

Lessons learnt from the use of the modified tool in the workshop were the importance of fully understanding the planning conditions, community relations, traffic impact, site access and dealing with neighbours all of which could have had a negative impact on time. The client value system as configured carried no opportunity for discussing politics, considered to be wrapped up in environmental impact. This caused some confusion and a future improvement would be the inclusion of Politics/Community. This variable meets the rules of discretion and continuum. The variable "Utility" gave some problems as it was interpreted as "Fitness for Purpose" which would have been too inclusive, but this was resolved by discussion.

A. Capital Cost - CAPEX							
B	B. Through Life Cost - OPEX						
C	C	C. Time					
D	B	C	D. Exchange				
E	B	C	D	E. Environmental impact			
F	B	C	F	F	F. Utility		
G	B	C	D	G	F	G. Esteem	

A	B	C	D	E	F	G	
0	5	6	3	1	4	2	Total

Figure 7.2 Client Value System for Regional Distribution Centre

7.03 Project 2 – workshop in preparation for a framework tender

The purpose of the workshop was to bring a team comprising a facilities management organisation, (lead partner), a contractor and a project management organisation to a common understanding of the requirements of a public sector client seeking a framework agreement for all maintenance and small works within a region. Until the day of the workshop it was expected that the client would send a representative to the workshop, (a similar offer had been made to the other five tendering organisations who had succeeded in the pre-qualification) however, before the workshop the offer was withdrawn. The client value system was completed by one of the project management team who had been on secondment to the client, together with the national director from the lead partner. The client value system matrix was used as a means of understanding the client in the context of the tender and also as a knowledge levelling device between the three parties. The rule that only the client was allowed to address the paired comparison questions was relaxed in this instance.

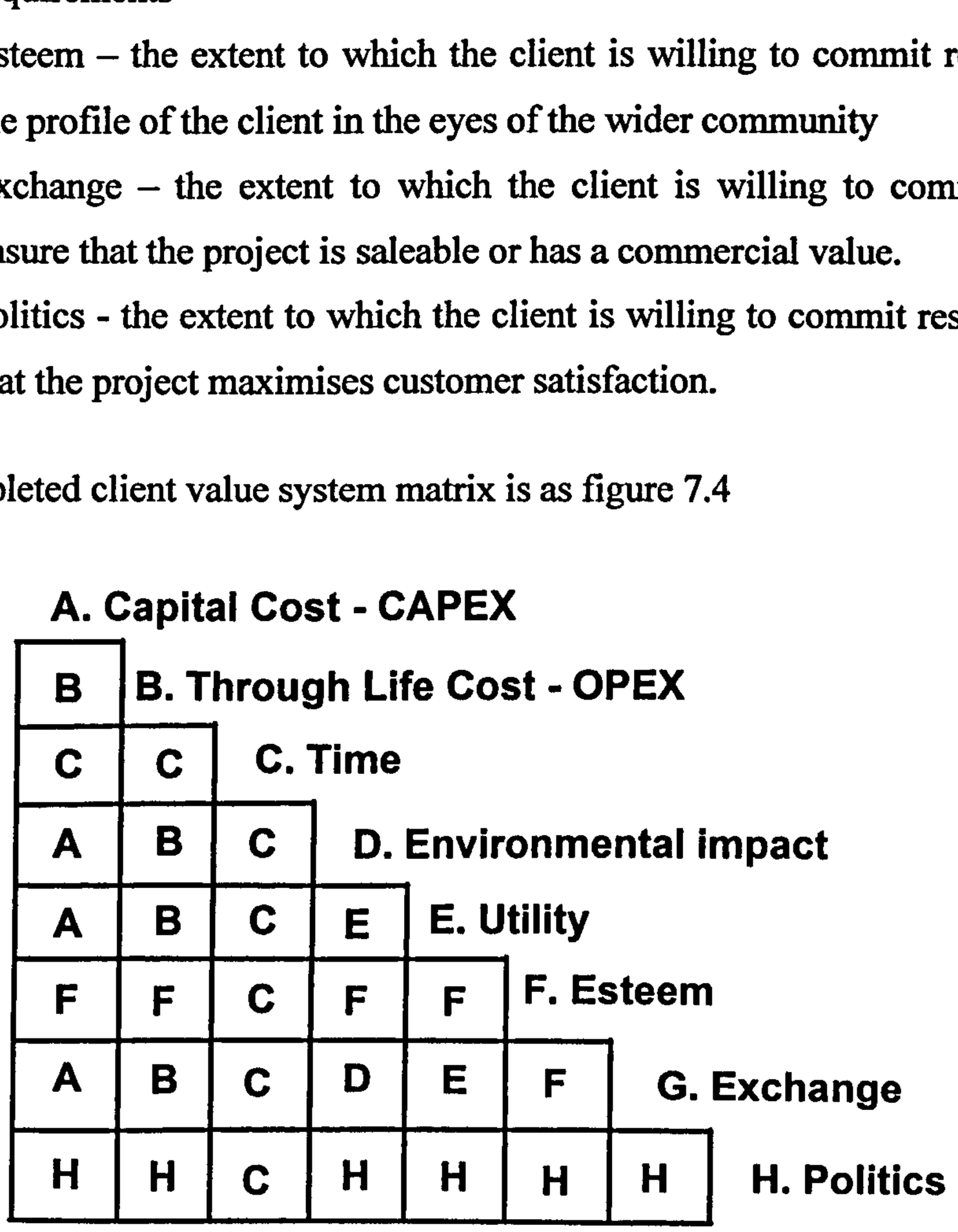
Procurement:	Framework agreement.
Workshop timing:	Immediately following the successful pre-qualification – VM commission by the facilities manager
Design by:	Not applicable
Design stage:	Briefing. The tender had to include outline costing and outline design solutions for an unspecified (but thought to be five) minor works projects.
Primary issues at the workshop:	Selection of key suppliers, assembling a competitive supply chain, getting to the client's table, risk management and specifically risk share strategies, TUPE, [Transfer of Undertakings (Protection of Employment) Regulations 1981], educating existing works officers away from existing procedures.
Attendees:	Facilities Manager: national director, regional director, project manager (of the bid project), works manager. Contractor: regional construction directors (2), facilities management director (PPP/PFI), estimator, supply chain manager Project Manager: consultant project managers (2) Facilitator and recorder

Figure 7.3 – Thumbnail sketch of framework tender project

In this workshop a definition of the terms used was displayed on a flipchart as:

a) Capital cost – the amount of budget for capital purchases
b) Operating cost – the amount of the budget for operating the facility
c) Time – the time from now until the project is in being
d) Environment – the extent to which the client is willing to commit resources to minimising the impact of the project on the environment
e) Utility – the barest minimum provision to meet the project's functional requirements
f) Esteem – the extent to which the client is willing to commit resources to raise the profile of the client in the eyes of the wider community
g) Exchange – the extent to which the client is willing to commit resources to ensure that the project is saleable or has a commercial value.
h) Politics - the extent to which the client is willing to commit resources to ensure that the project maximises customer satisfaction.

The completed client value system matrix is as figure 7.4



A	B	C	D	E	F	G	H	
3	4	7	1	2	5	0	6	Total

Figure 7.4 Client Value System for Framework Tender Project

The conclusion in respect of the "second guessing" of the client value system indicated that the client would be looking for the tender on the dates previously given although

there had been substantial slippage in the feed of information to the tenderers, that the client was engaged in a difficult political exercise with the client's customers and that the exercise had to raise the profile of the client within the wider public sector and commercial community. The planning of the tender submission was coloured by these conclusions. There was a question as to whether the exercise reflected the public face of the client and this was concluded in the negative since the information upon which it was based was internal to the client organisation.

This workshop benefited from a clearer statement of the client value system variables. However, the "Utility" variable was difficult to describe until it was realised that utility was one end of a continuum at which the other end was opulence. With reference to figure 6.8 it was determined that the collective description of the continuum was comfort. Whilst this collective was not a good fit with civil engineering projects it would fit with building or service projects. It was decided to introduce the continuum itself at the next workshop. The reason for introducing the continuum was to help the client focus on the discretionary nature of each variable before attempting to rank them through paired comparison.

7.04 Project 3 – proposed new aviation bulk fuel carrying vehicle park

The purpose of the workshop was primarily training although the team were the contractor's staff who interact with the client on the measured term form of contract. The client representative responsible for the project was also present. The project was a live project brought by members of the team and the client.

Procurement:	Measured Term Contract
Workshop timing:	Following the preparation of sketch designs – VM commission by contractor
Design by:	Consultant engineers
Design stage:	Outline sketch design
Primary issues at the workshop:	The existing vehicle park for bulk fuel tankers fuelling military aircraft was inadequate and had failed an internal safety audit. There was a danger that the operating licence would be withdrawn which would compromise operability. The primary functions of the project are illustrated in figure 7.6.

Attendees:	Contractor: regional construction director, facilities works services managers (2) estimator, quantity surveyors (2), project manager, site engineers (2) Client: Deputy project manager (IPT) Facilitator and recorder

Figure 7.5 – Thumbnail sketch of bulk fuel park project

The issues surrounding the operability of the project were complex and involved an understanding of the logistics of fuelling aircraft at dispersal points with various grades of fuel dependent upon aircraft type and current duty.

The project 2 workshop had led to the conclusion that it was the nature of the continuum scale which caused debate over the precise meaning of the variables. Therefore, at the workshop it was decided to prefix the value system matrix by firstly completing a set of continuums. The completed continuums are shown in figure 7.7.

Addressing the incremental action research improvements based upon this project it was concluded that the continuums were not helpful in sensitising the client to the completion of the value system. It was explained a number of times that the continuums represent each variable on a scale, they are not inter-related nor in a hierarchy. However, in this workshop the continuums drove the matrix such that the rank order of variables reflected almost exactly the position on the continuum scale. The client could not disconnect the logic that if his organisation saw environmental protection as vitally important then it had to be at the top of a hierarchy. It was decided to discontinue the continuums until further theory could be developed which disconnected the values on the continuum with the ranking explicit in the matrix. (This was not achieved within this doctoral research).

The use of comfort however, was well understood, in this case it related primarily to the tanker drivers.

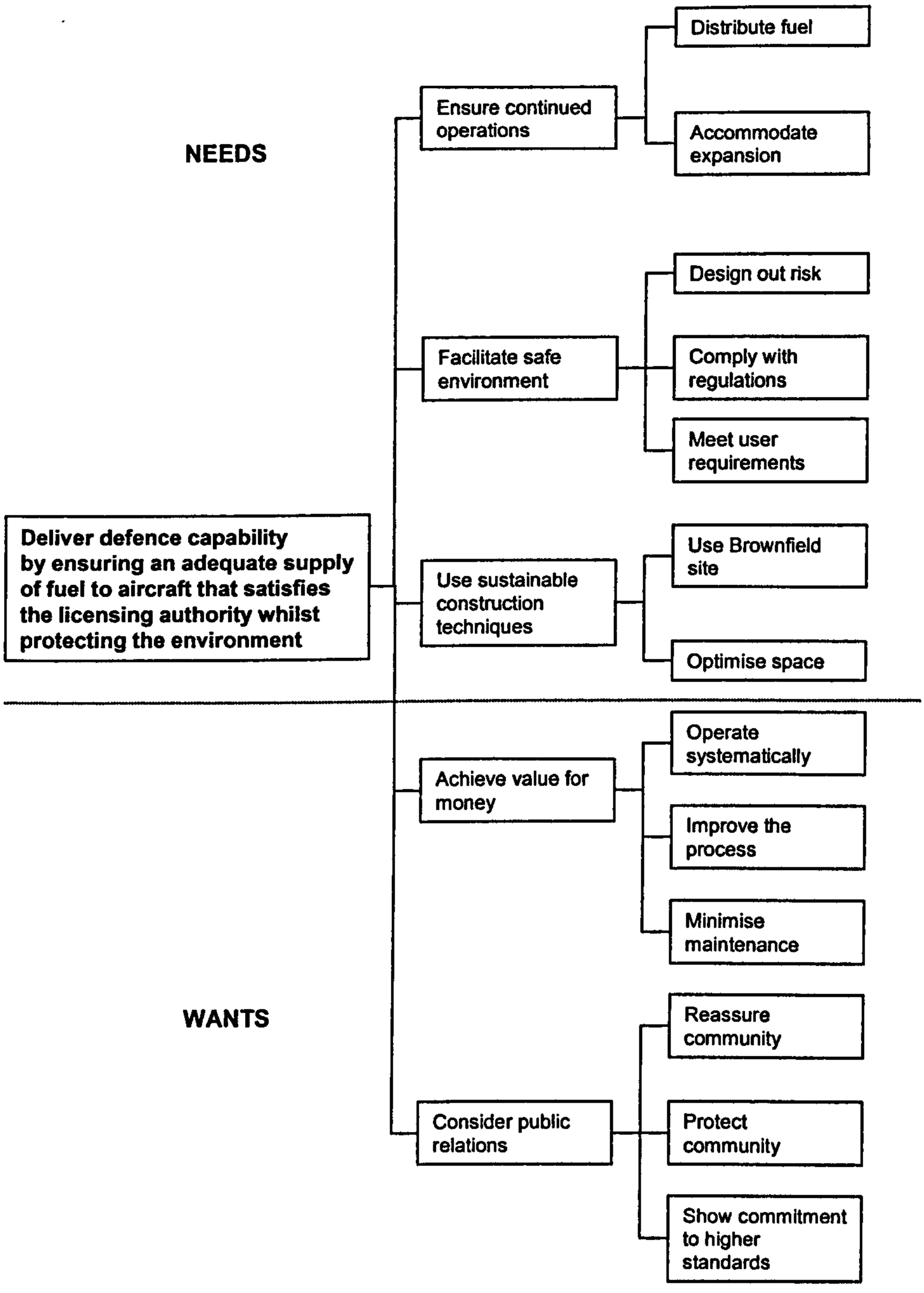


Figure 7.6 Function diagram of aviation bulk fuel carrying vehicle park

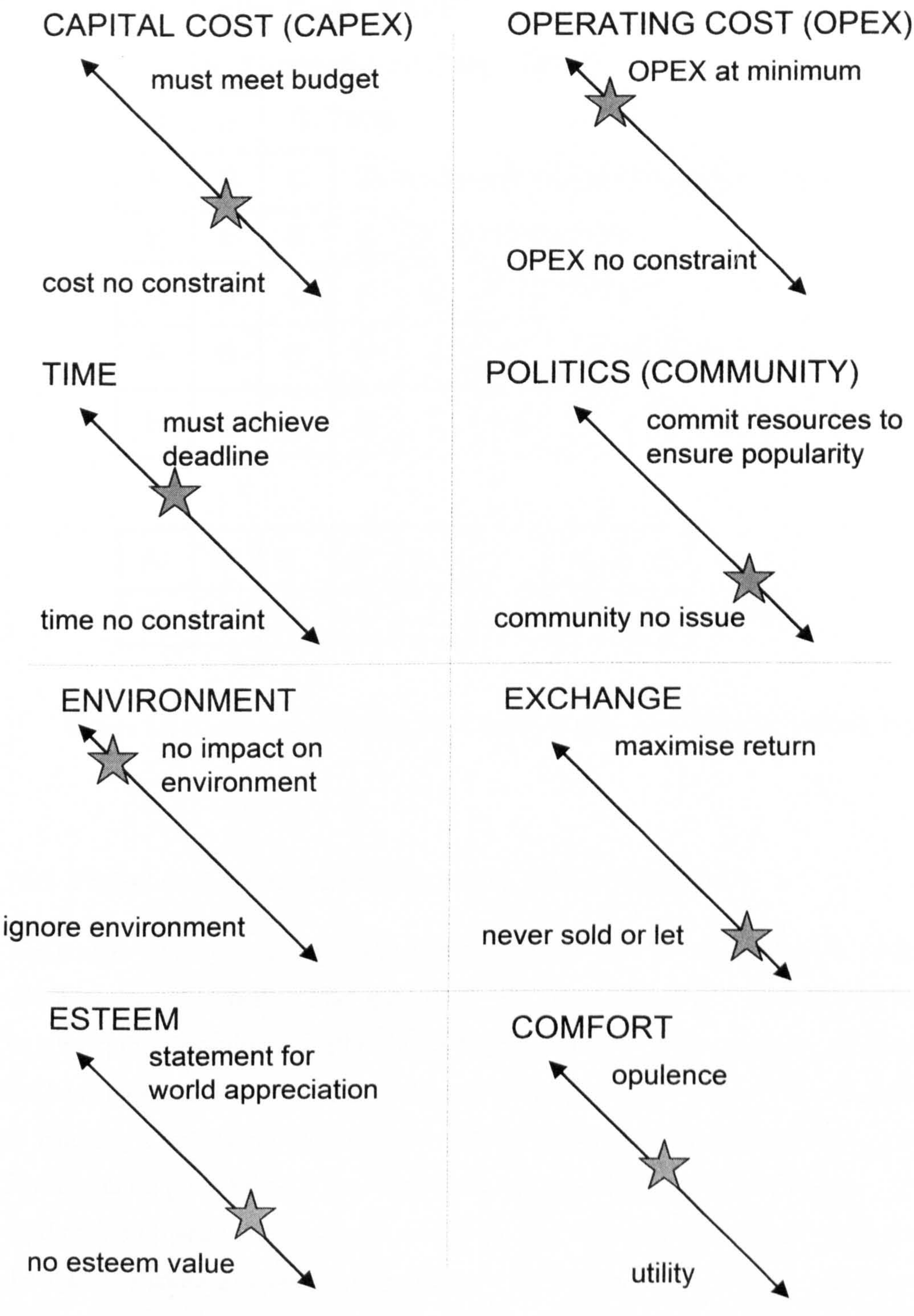


Figure 7.7 Client Value System Continuums

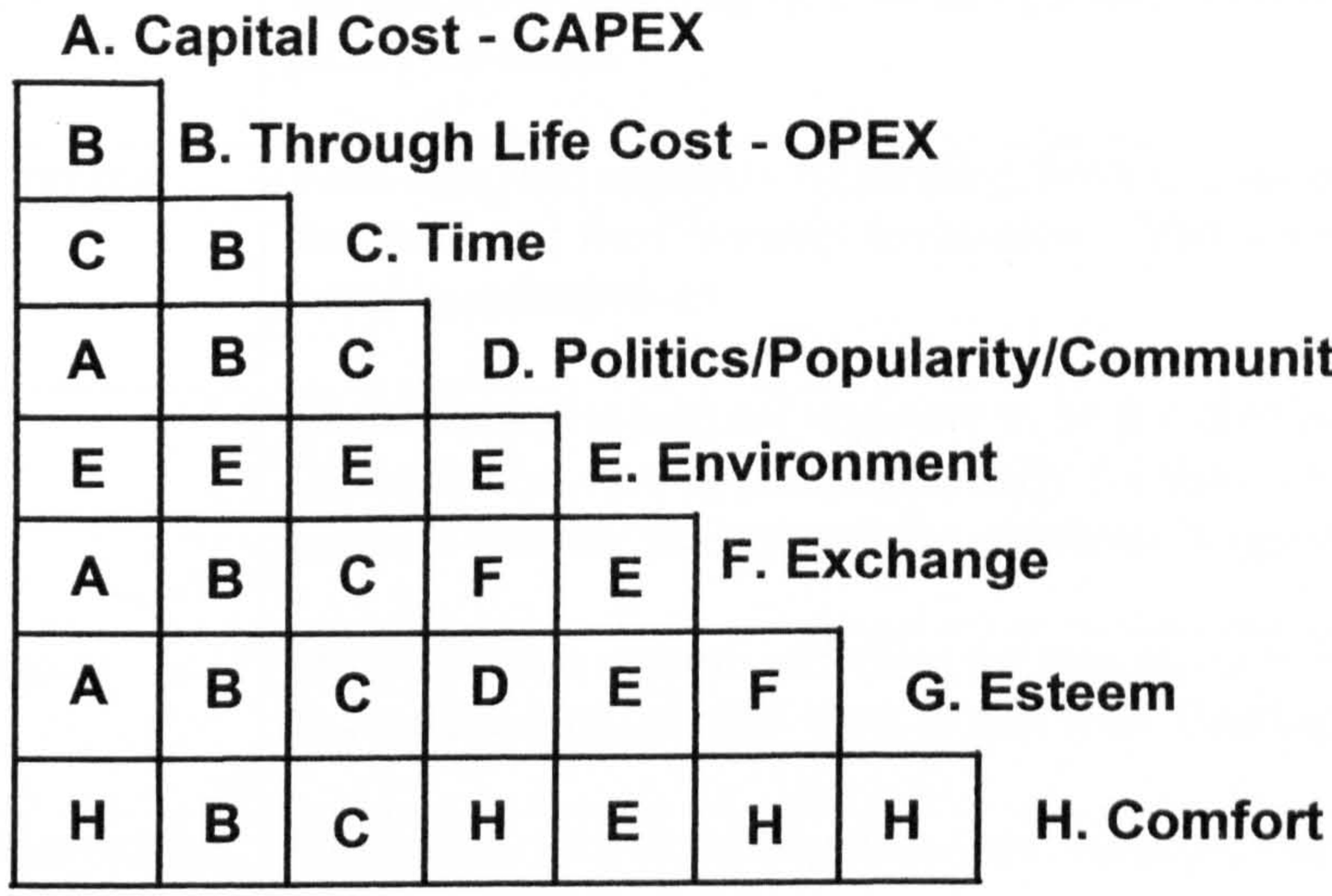


Figure 7.8 Client Value System for Aviation Bulk Fuel Carrying Vehicle Park

7.05 Project 4 – housing association brown field development

The project involved the construction of new houses on potentially three sites owned by Glasgow City Council. The largest of the three sites had recently been cleared following the demolition of all existing housing. The method for obtaining funding by the housing association necessitates an application to Communities Scotland (equivalent to Housing Corporation in England). The application gives details and a cost plan. Further funding to 100% of the value of the project is obtained from a bank. Once the funding is in place the project can commence but for the fixed budget. Under spending the budget results in a lower contribution by Communities Scotland. On this project there were three workshops, a partnering workshop, a value management workshop to refine the brief and a value engineering workshop on completion of the design. At the time of the partnering workshop the contractor had been chosen based on the first stage of a two stage tender, i.e. contracts would not be signed until the contractor could tender a lump sum.

Procurement:	Partnering overlaying JCT 98 design and build contract with a pain/gain share.
Workshop timing:	Following the approval of funding from Communities Scotland and the Financial Institution – VM commission by housing association.
Design by:	Architect and structural engineer to be novated to contractor. Quantity surveyor appointed initially for the cost planning exercise but then to become the employer's agent.
Design stage:	Initial scheme design sufficient for cost plans to be presented to funders. (consultants work at risk until funding is obtained)
Primary issues at the workshop:	Partnering, project management and supply chain management
Attendees:	Client's development officer and clerk of works Employer's agent (partner in QS practice) Consultant architect (partner) and engineer (associate partner) Associate director – bank Contractor – development surveyor, contracts manager, prospective site manager. 2 facilitators and a recorder

Figure 7.9 – Thumbnail sketch of the housing association partnering workshop

The primary task of the first workshop was to build the partnering agreement between the parties. This is summarised in the function diagram (figure 7.10). The client value system was used as a means of transferring the explicit values of the client to the contractor. Prior to the workshop all parties (excepting the bank) had been interviewed in an attempt to determine the corporate values of the organisation. No attempt was made to illicit personal values.

The client value system was completed by the development officer in the presence of the team. In a similar manner to project 1 there was some questioning by the team but following the rules laid down for the completion of the exercise no attempt was made to influence the client. The client value system is given in figure 7.11.

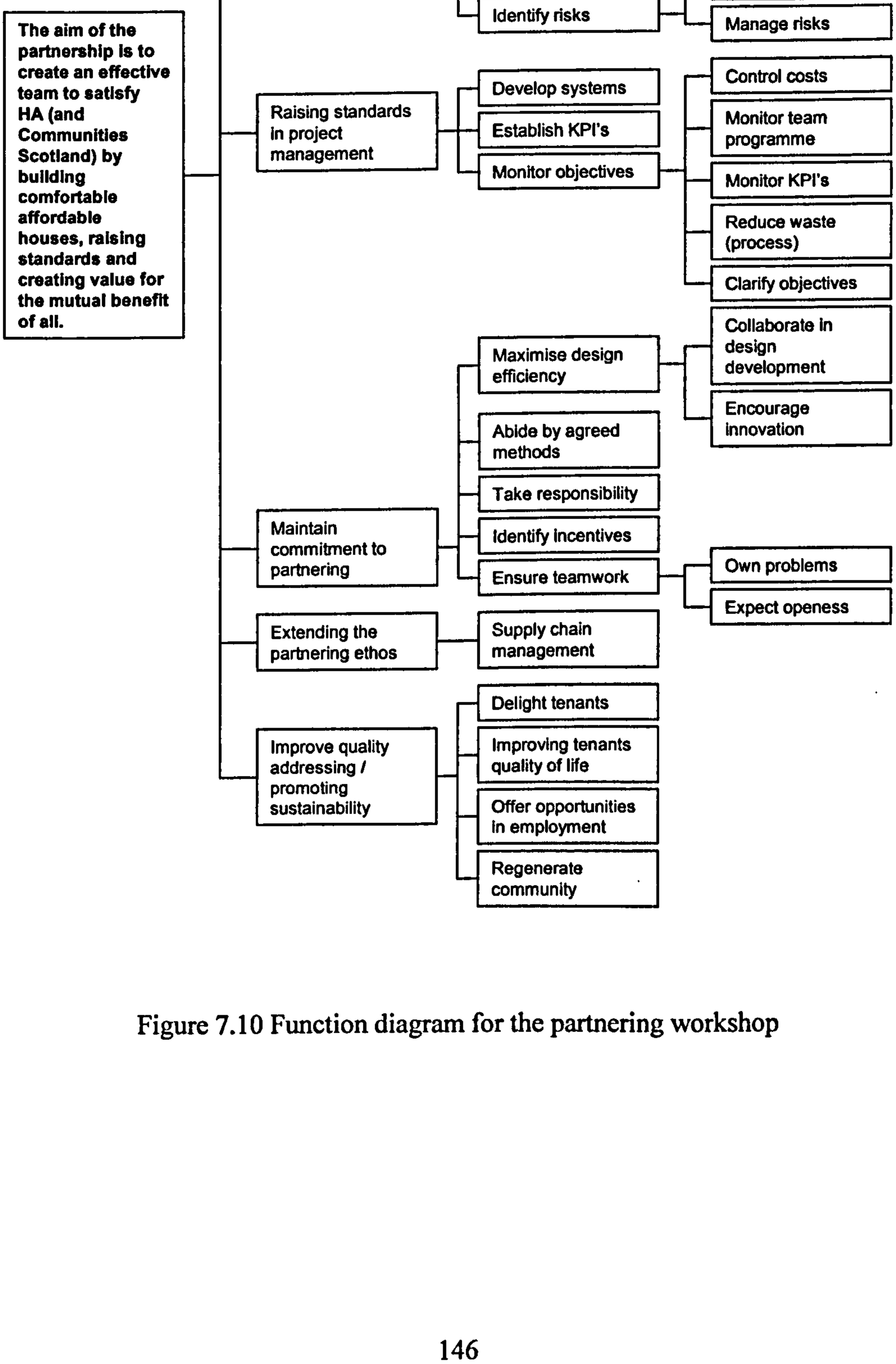


Figure 7.10 Function diagram for the partnering workshop

A. Capital Cost - CAPEX							
B	B. Operating Cost - OPEX						
A	B	C. Time					
A	B	D	D. Environment				
A	B	E	D	E. Esteem			
A	B	C	D	E	F. Exchange		
A	G	G	G	G	G	G. Comfort	
A	B	H	H	H	H	G	H. Politics

A	B	C	D	E	F	G	H	
6	6	1	3	2	0	6	4	Total

Figure 7.11 Client Value System for the housing development

The analysis of this exercise was that that it went very smoothly. The team was very receptive, the client was clear and the facilitation was better directed than on previous studies. At the time of the pre-workshop interviews the architect had said that his personal ambitions were to have good reviews of the scheme with pictures of aesthetically pleasing housing in an attractively landscaped environment in some of the design journals. Following the exercise the architect said that his focus was to be on the internal comfort rather than the external aesthetic.

Three weeks following the partnering workshop a value management workshop was held to formalise the brief. There had been some changes during the three weeks including the rejection of one of the sites as being unsuitable. The purchase of a new site from Glasgow City Council was being negotiated but the project was proceeding on the basis of a two site development with almost the full complement of housing anticipated for the three sites. The team at the workshop was the same as for the partnering workshop with the addition of the project architect for the scheme, the director of the housing association, the planning supervisor, and with the loss of the representative from the bank.

The focus of the briefing workshop is summarised in the function diagram figure 7.12. A clear wish of the client was that the houses should not date and be as desirable to future tenants as to those in first occupation. This was encapsulated into the function diagram but may not have been caught explicitly in the value system. The issue of timelessness is in part the aesthetic function of style and in part a technical function of the housing to be updated. This was not resolved before the client value system was re-run for the benefit of the director of the housing association. The logic of the diagram was explained by the development officer. This confirmed two things, firstly the development officer was able to recapitulate the logic of the diagram clearly and secondly that the director was able to understand the logic and agree that the diagram accurately represented the corporate value system. At no point did the individuals personal values interject in the process.

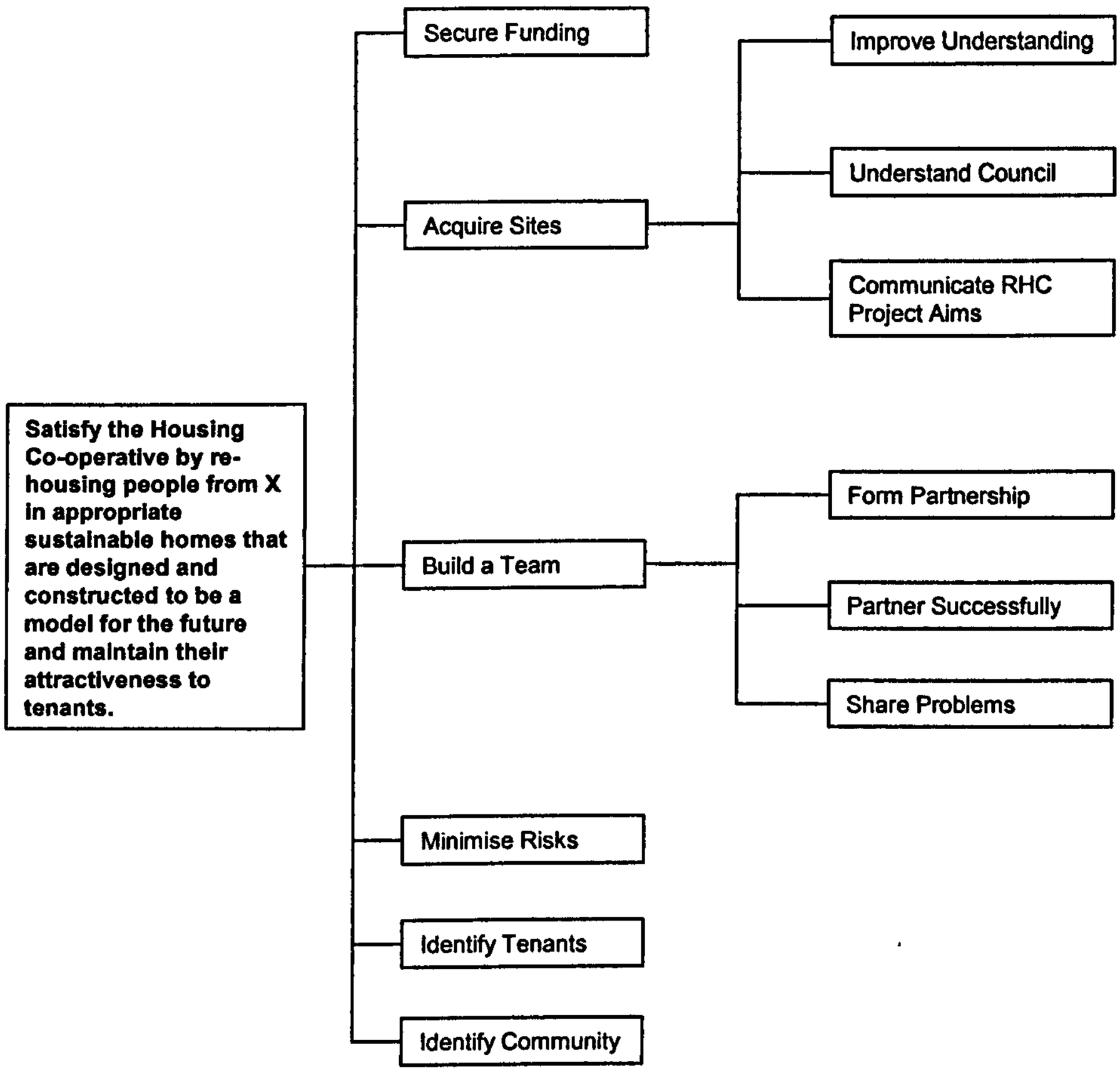


Figure 7.12 Function diagram of the value management briefing study

7.06 Project 5 – workshop to improve communication and organisation on a speculative gateway office project

The aim of the workshop was to orientate a group of contractor's representatives and consultants towards the formation of an efficient design and build team. The contractor had won a design and build bid based upon a brief compiled by a project manager and an outline scheme prepared by a group of consultants who were to be novated to the contractor. The project was for the gateway building of a new office park. The client value system was completed by the senior project manager seconded to the client and was the person who had written the brief. The client value system matrix was used as an orientation device and guided the deliberations of the workshop towards appropriate communication and organisation structures produced in the workshop as a series of process maps.

Procurement:	Design and build with novated design team.
Workshop timing:	Immediately following the successful tender – VM commissioned by the contractor.
Design by:	Full consultant team
Design stage:	Post sketch design
Primary issues at the workshop:	Co-ordination of design, design queries and problems mapping, design freeze dates, quality of information, learning structures, late variations, buildability, control of snagging.
Attendees:	Client; project manager and employers agent, clerk of works, cost consultant. Consultant project manager Contractor: project manager, proposed general foreman, quantity surveyor Consultant architects (2) M & E engineers (3) Structural engineers (2) Landscape architect Facilitator and recorder

Figure 7.13 – Thumbnail sketch of communication and organisation project

One of the primary purposes of the workshop seen by the contractor was to increase communication and operational efficiency on the project by making overt the successful experience of the team on previous projects. The workshop provided the forum to raise

issues, highlight inefficiency, capture past examples of high efficiency, understand the client value system, and plan for future projects beyond the gateway building. The clients value system, demonstrated that the three most important aspects to the client are in order; Esteem, Exchange and Comfort. This was summarised as the project must make an aesthetically attractive statement as the gateway building, it must attract a high lease/resale value and the end users comfort must be considered in the design. As in previous projects the rules were laid down regarding client only input and any interjections by the design team were by way of clarification. There were no problems regarding the meaning of the variables.

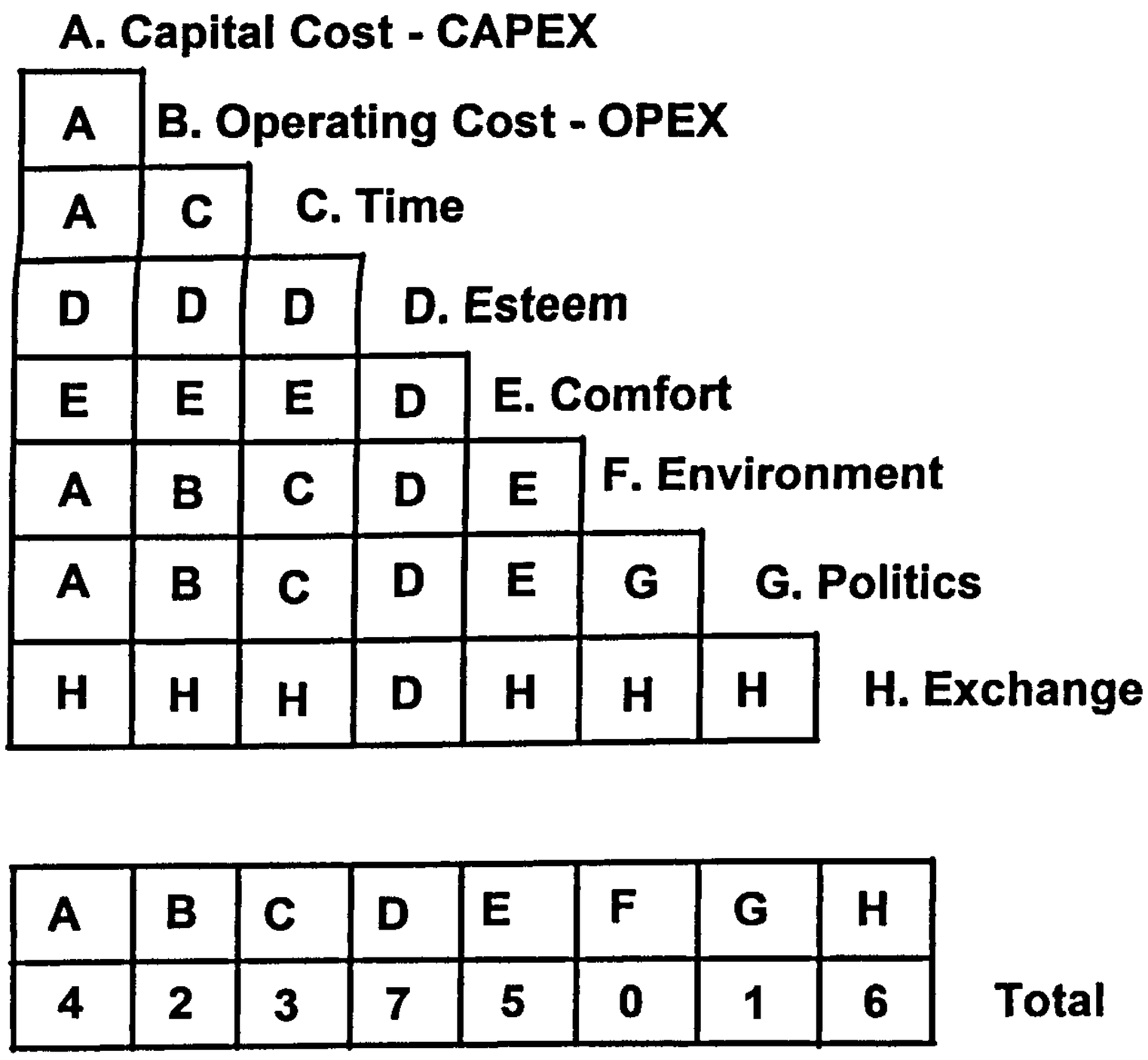


Figure 7.14 Client Value System for the gateway office building

This was the second project and third workshop with the same client value system matrix which had worked well, was understood by the client who was able to make the value system explicit. At this workshop the team were asked for additional value criteria but all suggested e.g. minimum maintenance, were highly correlated with existing variables. This led to a high level of confidence in the model.

7.07 Project 6 – Ambulatory Care And Diagnostic centre (ACAD)

The ambulatory care and diagnostic centre was planned for an English city to work in collaboration with an existing district general hospital. The project had been the subject of a traditional contract under which sketch design drawings had been prepared and a cost plan developed. The outline business case had been approved but the cost plan exceeded the budget and the project was on hold at the time that Procure21 was introduced. The client decided to adopt Procure21 as the procurement route and revisit the brief with the objective of arriving at an affordable solution prior to applying for full business case approval. The workshop was called to bring the members of the integrated project team up to speed quickly whilst re-examining the brief in order to reduce the estimated £26m scheme to within the £20m budget. At the workshop a number of suggestions were made for the reduction of building area without compromising functionality. During the 10 month period following the workshop the scheme progressed at a very slow rate due to problems within the client organisation, not the least of which was a client statement that the original £20m budget was inclusive of VAT bringing the effective budget to £16.86m. A second workshop was called to pull the scheme together to the point where it could proceed at a rapid rate.

The two workshops gave an opportunity to review the development of the client value system under the two circumstances on the same project.

Workshop 1

Procurement:	Procure21
Workshop timing:	At strategic briefing stage (notwithstanding that there had been a previous scheme) – VM commission by Procure21 contractor
Design by:	Consultant architects and engineers – part of the Procure21 contractor's supply chain
Design stage:	No design (notwithstanding that a previous scheme was in existence)
Primary issues at the workshop:	Budget, shared facilities by differing medical specialties, change in clinical professional boundaries and future capacity on site.
Attendees:	Client: project sponsor for this project, project manager for this project, GP/Acute care liaison (local GP), representative

	of a hospital management company. Client appointed cost consultant Contractor: regional director, senior project manager, estimator. Contractor's supply chain: hospital planning (2), architect, quantity surveyor. Facilitator and recorder

Figure 7.15 – Thumbnail sketch of workshop 1 ACAD project

When the client value system matrix was introduced at workshop 1 there were three queries. The client project sponsor said that to meet the budget of £20m was paramount and therefore this would take priority over all other factors. The second query was there was no possibility that this project would have any exchange value. The third query was that there was no variable for flexibility and that this building was required to be very flexible. The facilitator's reply was that the £20m should be viewed as adequate and that the heading CAPEX should be considered from the perspective of "if I wished to make a saving I would willingly sacrifice expenditure on XX". In the completed diagram the result suggests that the client would prefer to make a saving now and be willing to pay additional OPEX in the future. Similarly, the client would be willing to cut back on environmental (green) initiatives and esteem to save money. The reply to the exchange variable was that it could be excluded and to the flexibility variable that it should be included. The result for the final model is given in figure 7.16.

	A. Capital Cost - CAPEX						
A	B. Operating Cost - OPEX						
C	B	C. Time					
A	B	C	D. Environment				
A	B	C	D	E. Esteem			
F	F	F	F	F	F. Flexibility		
G	B	G	G	G	F	G. Comfort	
H	B	H	H	H	F	H	H. Politics / community / service outcomes

A	B	C	D	E	F	G	H	
3	5	3	1	0	7	4	5	Total

Figure 7.16 Client Value System for ACAD project

The outcome of the client value system matrix demonstrates that flexibility is the most sought criteria with operating cost, local politics and community and patient and staff comfort almost equally important. A number of issues arose from this workshop. Firstly, was the explanation given at the workshop correct or is there a special characteristic of public sector projects with a fixed budget which has not hitherto been explored. Secondly, flexibility is a valid variable on a continuum between, building is fixed in terms of internal arrangement to, the building is highly adaptable internally and externally.

Workshop 2

As intimated above this project proceeded slowly whilst budgeting was resolved within the client organisation. Ten months following the first workshop another workshop was held to re-orientate the team on the task ahead. This was necessary as due to changes in the contractor's supply chain and changes of personnel in all organisations only the client sponsor and the senior project manager were the same individuals.

Procurement:	Procure21
Workshop timing:	Outline sketch design – VM commission by Procure21 contractor
Design by:	Consultant architects and engineers – part of the Procure21 contractor's supply chain
Design stage:	Outline designs based upon the initial brief the original client value system and a budget of £20m.
Primary issues at the workshop:	Identify project constraints, understand risk issues, establish key milestones, identify key space planning issues, focus on efficient built space, achieve the floor area required and meet the budget of £16.86m
Attendees:	Client: project sponsor for this project, site development manager for this project. Client appointed: design adviser, cost consultant. Contractor: regional director, senior project manager, head of estimating, senior estimator, project manager, design manager, commercial manager (strategic projects), healthcare planner. Contractor's supply chain: architect, quantity surveyor, structural engineer, services project manager, risk manager. Facilitator and recorder

Figure 7.17 – Thumbnail sketch of workshop 2 ACAD project

When the client value system matrix was introduced at workshop 2 the client project sponsor said that in his view the definition of CAPEX made previously that "the £20m should be viewed as adequate" led to an exposition of the value system which was not wholly accurate. In a debate over budgets it was decided to view CAPEX as related to space such that the question was "are you willing to sacrifice space to offset future OPEX?" or "are you willing to sacrifice space to ensure an environmentally friendly solution?" The client project sponsor accepted that this was a better interpretation for the public sector client with a fixed budget. The client value system was therefore re-run to inform the new team. The client project sponsor, site development manager and consultant design adviser represented the client. The result is given in figure 7.18.

The changes represent the new focus on the project emphasising capital cost and time as the two key issues. All other factors remain similarly ranked. There was awareness that the reduced budget would put pressure on space and therefore this was more important than the other factors. Time was now critical as the anticipated opening date had not changed. The political issues surrounding *inter alia* drug rehabilitation had been resolved and therefore the politics had become less important ranked against the other variables.

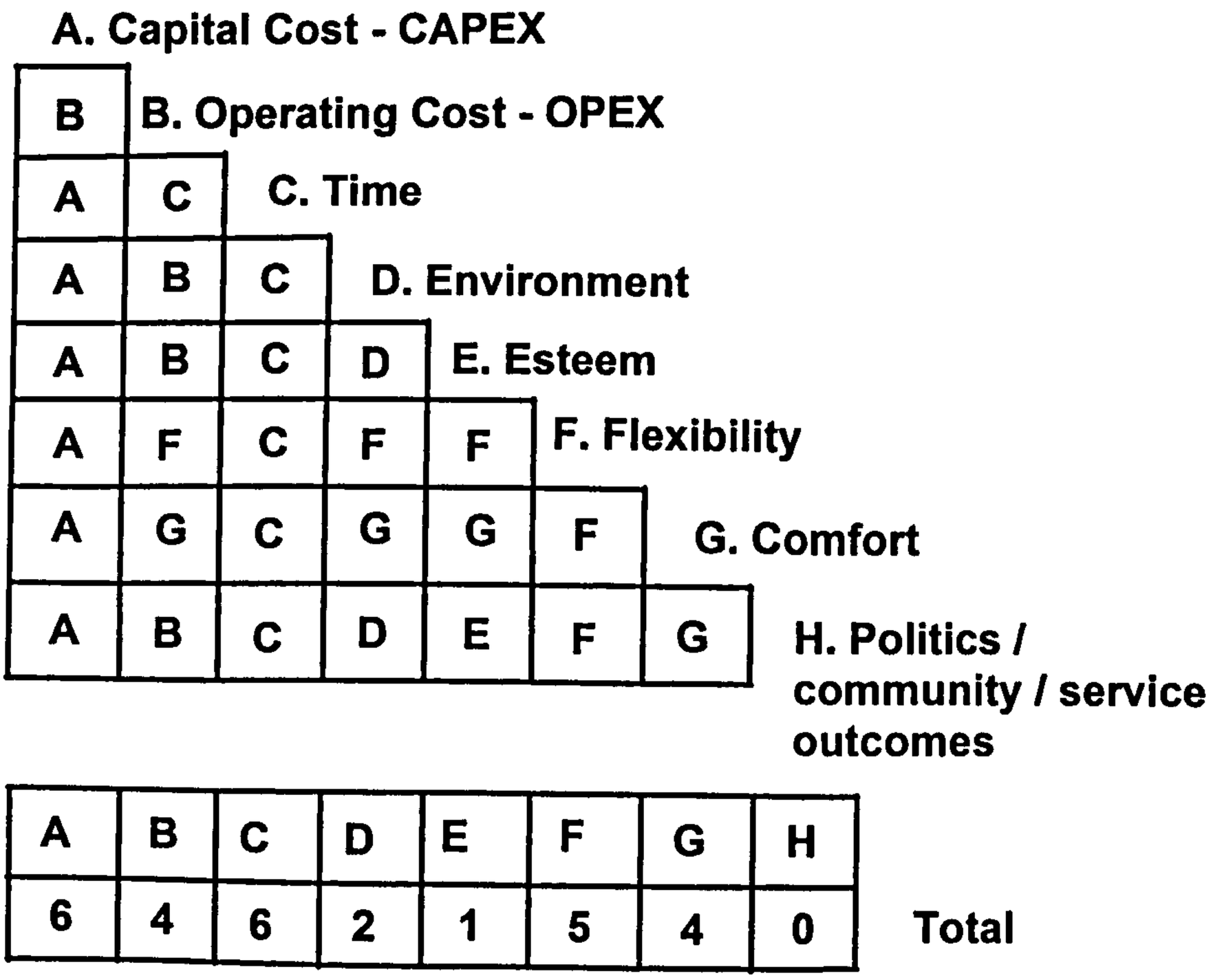


Figure 7.18 Client Value System for ACAD project

There is a debate following this project as to whether the client value system will change during the progress of the project. There is an a priori conclusion based upon project 4 that it will not provided the project is running logically and smoothly. However, when as in this case the client is walking on shifting sand then the client's view of the world will be altered.

Two changes to the client value system matrix arose as a result of this project. Firstly in situations where the budget is fixed then the form of the question has to be related to the sacrifice of space and secondly "flexibility" is a valid variable and will be added to the model.

7.08 Project 7 – new accident and emergency department

The workshop was held two months after a fire destroyed an accident and emergency unit at a district general hospital. Within days of the event a contractor was appointed under Procure21 to assess whether the structure remaining could be repaired or whether total reconstruction was required. Following tests by consultant structural engineers (members of the contractor's supply chain) the decision was made to reconstruct the accident and emergency department. The disaster recovery plan put into operation within hours of the fire was performing adequately and therefore it was decided to spend a reasonable time planning a new A & E department.

A half day workshop was held to consolidate the stage of the project, to understand some of the project issues, and determine spatial adjacency and the linkages required with the rest of the hospital. A strategic brief statement was agreed as:

> *'To redefine and redesign the service provision for accidents and emergencies at The Hospital in keeping with the recommendations arising from the NHS Plan in particular the requirements outlined in the document 'Reforming Emergency Care.''*

Procurement:	Procure21
Workshop timing:	Strategic brief – VM commission by Procure21 contractor
Design by:	Contractor's supply chain architect's and engineers

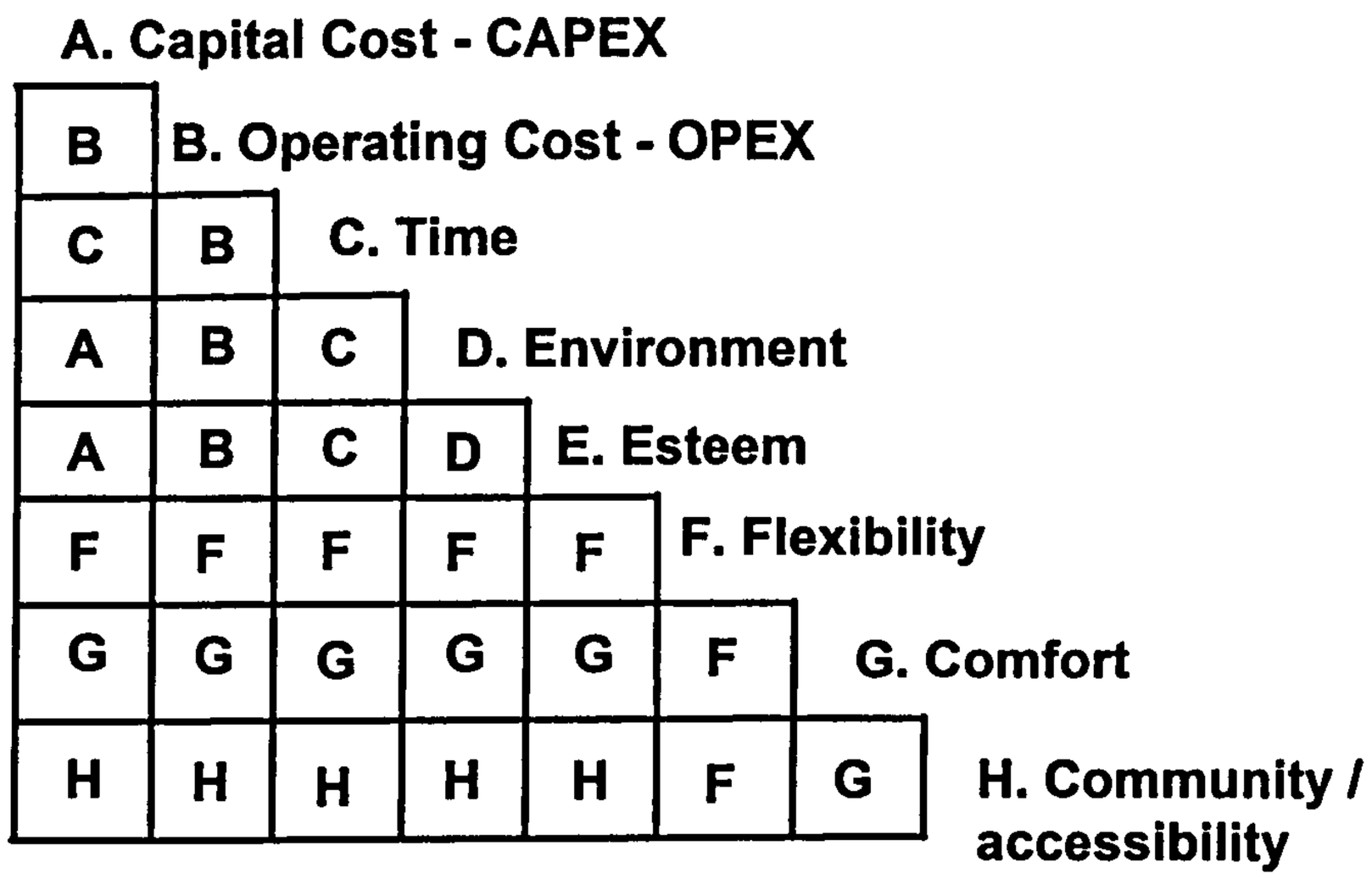
Design stage:	Strategic brief
Primary issues at the workshop:	Future development of the hospital, physical constraints, risk of not involving primary care, cross linkages with primary care, impact of loss of service, incorporation of changes in A&E practice, patient blockages, immediate (front door) respiratory and cardiac service.
Attendees:	Client – Medical consultants (6) Client – Service managers (7) Client – Nursing (1) Client – Financial Planning (1) Capital Projects Manager (1) Client – Project sponsor, project managers (3) Contractor – Senior Project Manager, Project managers (2), Contractor's supply chain – architect, cost consultant, hospital planner, Facilitator and recorder

Figure 7.19– Thumbnail sketch of A & E project

The introduction of the client value system by the facilitator to the team used the definitions as in project 6. A brief discussion of any missed values highlighted "accessibility" which referred to the desirability of being accessible to the local community. This was appended to the community variable. Another suggestion was 'accident prevention' from the perspective of safety which was excluded on the basis that safety was a basic function. With such a diverse client body present the project sponsor was invited to complete the matrix but she deferred to the medical consultants present. The consultants, all from different medical specialities, were of one mind in the completion of the matrix which reinforced the issues of the understanding of the model and also the theories relating to corporate and individual values. However, the medical consultants were less concerned about finance and there was some discomfort amongst the service managers and financial planners who when invited to comment by the facilitator, declined. This was seen as a problem in a situation where the client group can be viewed as a number of discrete disciplines and specialities and with differing responsibilities in a perceived or real hierarchy. This issue was not resolved.

The clients value system demonstrates that the three most important aspects to the medical consultants are in order; Flexibility, Comfort, and Community / Accessibility. This indicates that the built facility must be adaptable both internally and externally, for instance, in terms of expansion and linkages with the other hospital buildings. The project must take into account the internal comfort of patients and staff, and it must be considered accessible to the direct community and wider public. A comment made by a

member of the client group about the completed client value system matrix was that it reflects an 'inside building,' meaning that the focus is on how the building functions rather than its external form or aesthetic appeal.



A	B	C	D	E	F	G	H	
2	4	3	1	0	7	6	5	Total

Figure 7.20 Client Value System for A&E project

7.09 Project 8 – PFI schools project

The workshop was to consider a PFI bid of 23 school projects the majority of which were extensions and/or repairs. A new secondary school on a green field site was the largest individual project and was used as the focus of the workshop which was in part a training exercise for the bidding contractor. The project was introduced by the architectural team leader (part of the contractor's supply chain). The purpose of the workshop was to position the contractor to become preferred bidder and to prepare for the extensive negotiations likely to occur within the 3 months before contract close. To enhance the probability of becoming preferred bidder the cost of the secondary school needed to be reduced by 10% whilst retaining full functionality. The functionality of the project is summarised in figure 7.22

Procurement:	PFI in the closing stages before the selection of preferred bidder.
Workshop timing:	Two weeks following invitation to negotiate (with one other bidder) and six weeks ahead of final design – VM commission by contractor
Design by:	Consultant architects and engineers appointed by contractor.
Design stage:	Sketch design with cost plan (public sector comparator spread sheet for all projects had been made available to both tenderers)
Primary issues at the workshop:	Position of school on site, teaching spaces and adjacencies, security of pupils, flexibility of use by community (day time and evening), environmental impact.
Attendees:	Architect: Architectural team leader and project architect Contractor: D&B manager, D&B co-ordinator, contracts manager, project manager, business alliance manager, senior engineer, contracts supervisor, design manager, project estimator. Facilities Manager: Client account manager Facilitator and recorder

Figure 7.21 – Thumbnail sketch of schools PFI project

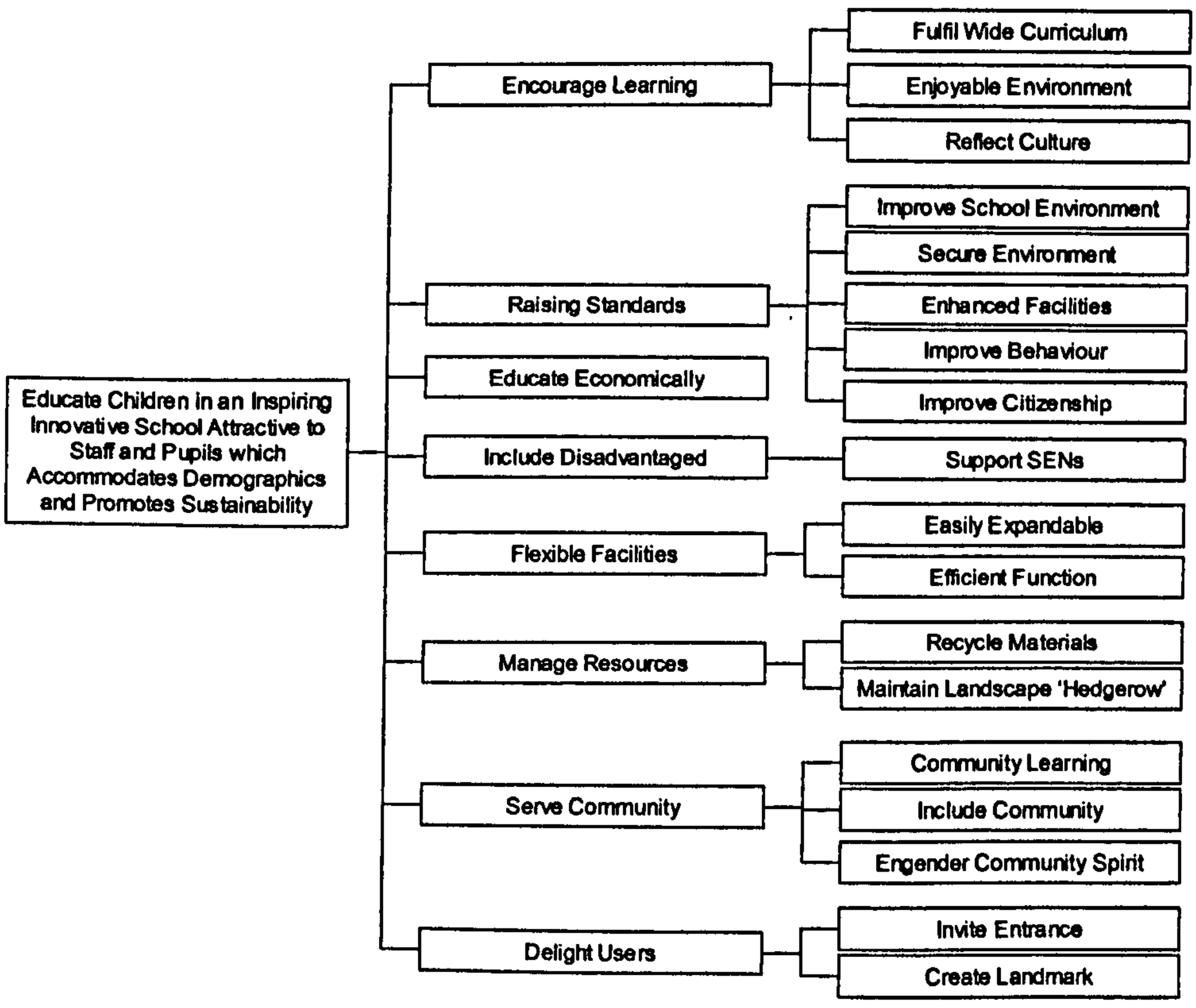


Figure 7.22 Function diagram of schools PFI project

The client value system was completed by the team based upon personal knowledge of the client through discussions to date and information contained in the tender documents. For this workshop the rules regarding the client only speaking had to be set aside in the absence of the client leading to considerable discussion but no disagreement. The exercise proved an important point raised in chapter 6 namely that in the absence of an explicit client value system the project team will imply one based upon the information that the team has of the client and particularly the client's public face. The project will always reflect some form of value criteria.

A further point reflected in diagram 7.23 was the issue regarding CAPEX and OPEX in a PFI project. The discussions here became confused as the team were focused on CAPEX and OPEX but the client would be focused on the unitary charge and would therefore be concerned with OPEX only. The trade off question of "would you be prepared to sacrifice space for comfort?" for example could not be posed since the space was laid down in the brief by reference to Department for Education and Skills (DfES) standards. In this instance since CAPEX and OPEX were equally ranked there was no problem but the issue as to whether to include every variable in every case is one that requires further consideration.

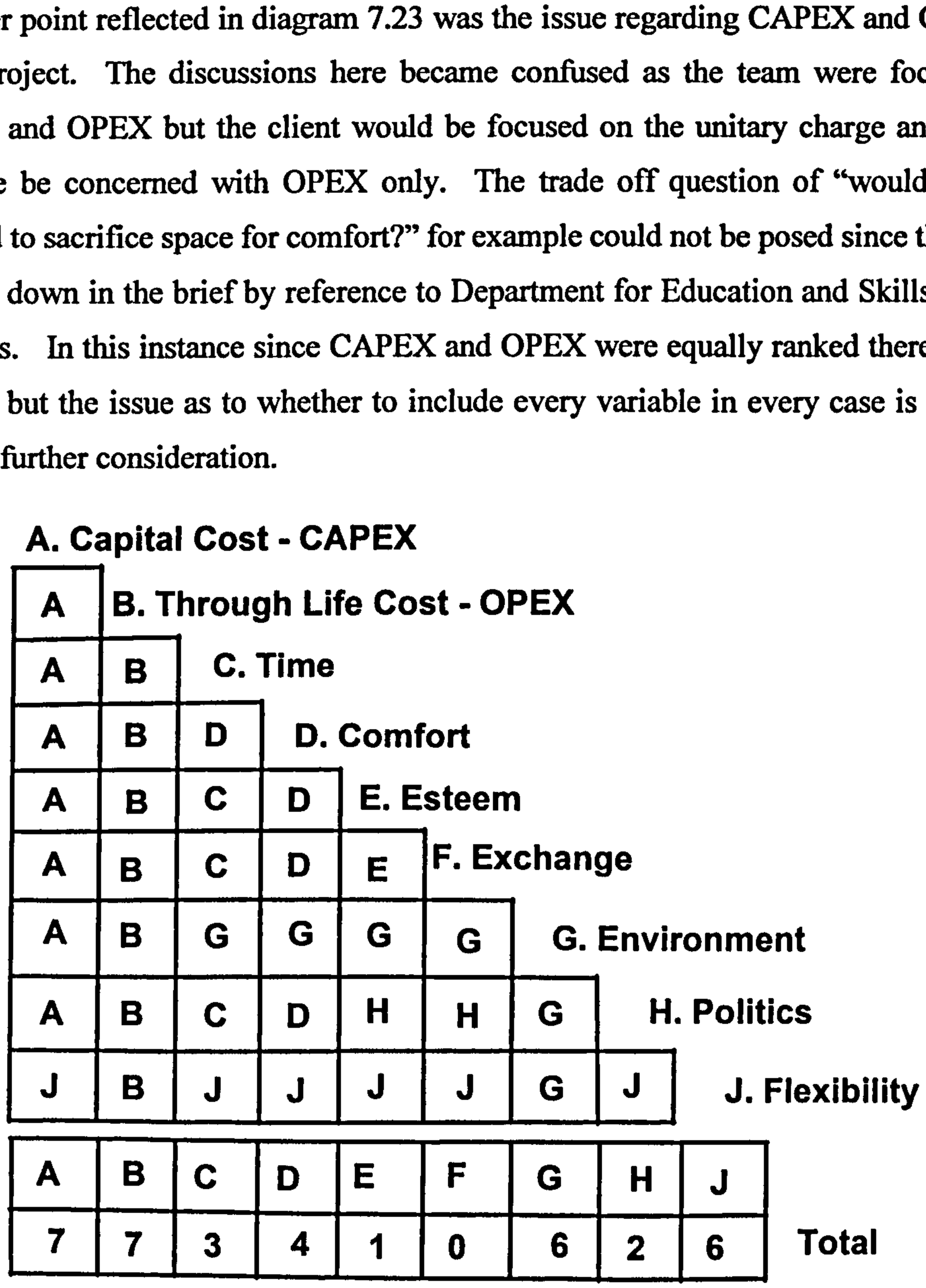


Figure 7.23 Client Value System for schools PFI project

The conclusion of the team was that the client would be seeking the lowest unitary charge consistent with providing a facility which would facilitate flexibility in use by pupils and the community at varying times during the day and evening whilst preserving the absolute security of the pupils. The emphasis given in the brief to an environmentally friendly solution also coloured the thinking of the team although there were queries to be referred to the client on the absolute meaning of some of the phrases in the brief. Finally, the variable, exchange, had a very real meaning in a facility some parts of which were to be rented to clubs and other organisations.

7.010 Project 9 – design build tender for a special school as a part of a schools framework agreement with a local authority.

The aim of the workshop was two fold, firstly to introduce the client to value management and secondly to build on the back of an existing project to secure a framework agreement for further projects. The project was design and build following a two stage tender and was at an advanced stage in design and also in the negotiation process. The new school was to replace an existing school. There was reported to be a £500,000 difference between the client and the contractor at the time that the workshop was set up and therefore the project was initially to be a value engineering workshop. However, by the date of the workshop the client, not willing to compromise a design which they liked, had secured additional funding. The workshop therefore was held to demonstrate to the client, value management at briefing and also to secure any value gains in the existing design through value engineering. During the illustrative briefing stage of the workshop a client value system matrix was used to focus the team on the value criteria of the client notwithstanding that design changes arising from the exercise would be impractical to make on the current project.

Procurement:	Two stage tendering leading to negotiated lump sum design and build contract.
Workshop timing:	At commencement of working drawings – VM commissioned by contractor at the request of the client.
Design by:	Consultant architects and engineers to be novated to contractor.
Design stage:	At commencement of working drawing but before planning permission had been obtained.

Primary issues at the workshop:	Programme, design approvals, design freeze, statutory approvals, requirement for BREEAM, buy-in of client and consultants into contractor's intranet.
Attendees:	Client: head teacher of existing school, managing quantity surveyor, project manager, development officer, electrical engineer, mechanical engineer, managing architect Consultants (to be novated) architect, electrical engineer, mechanical engineer , Contractor; Business alliance manager, design manager, contracts manager, contracts surveying manager, site manager. Facilitator and recorder

Figure 7.24 – Thumbnail sketch of special school project

The client value system matrix shown in figure 7.25 was completed by the development officer (who had compiled the existing brief) with assistance from the other client representatives. In the context of a large client representation this activity again supported the concept of organisational values as all representatives of the client were able to focus on the local authority value system. There was only one area where agreement could not be reached and this was the paired comparison between operating cost and comfort. This is demonstrated in the model. Even in the special school the variable exchange, had meaning since some specialist facilities such as the hydrotherapy pool were to be used by other organisations on a fee basis.

The debate over the variable flexibility, highlighted a complete misunderstanding between the headmaster, the development officer and the design team. The headmaster and the development officer were pleased that the proposed design had responded well to the brief flexibility requirement for a mix of rooms of differing size in a useful arrangement. The headmaster explained that the rooms would be put to differing uses dependant upon the special needs of particular cohorts of pupils. The design team had endeavoured to provide a building where every internal wall could be taken down. There were therefore some quick wins in terms of economy when this wrongly perceived requirement was removed. Other than this all definitions worked well and the value system revealed that the client was not willing to sacrifice space for a gain in another variable including OPEX.

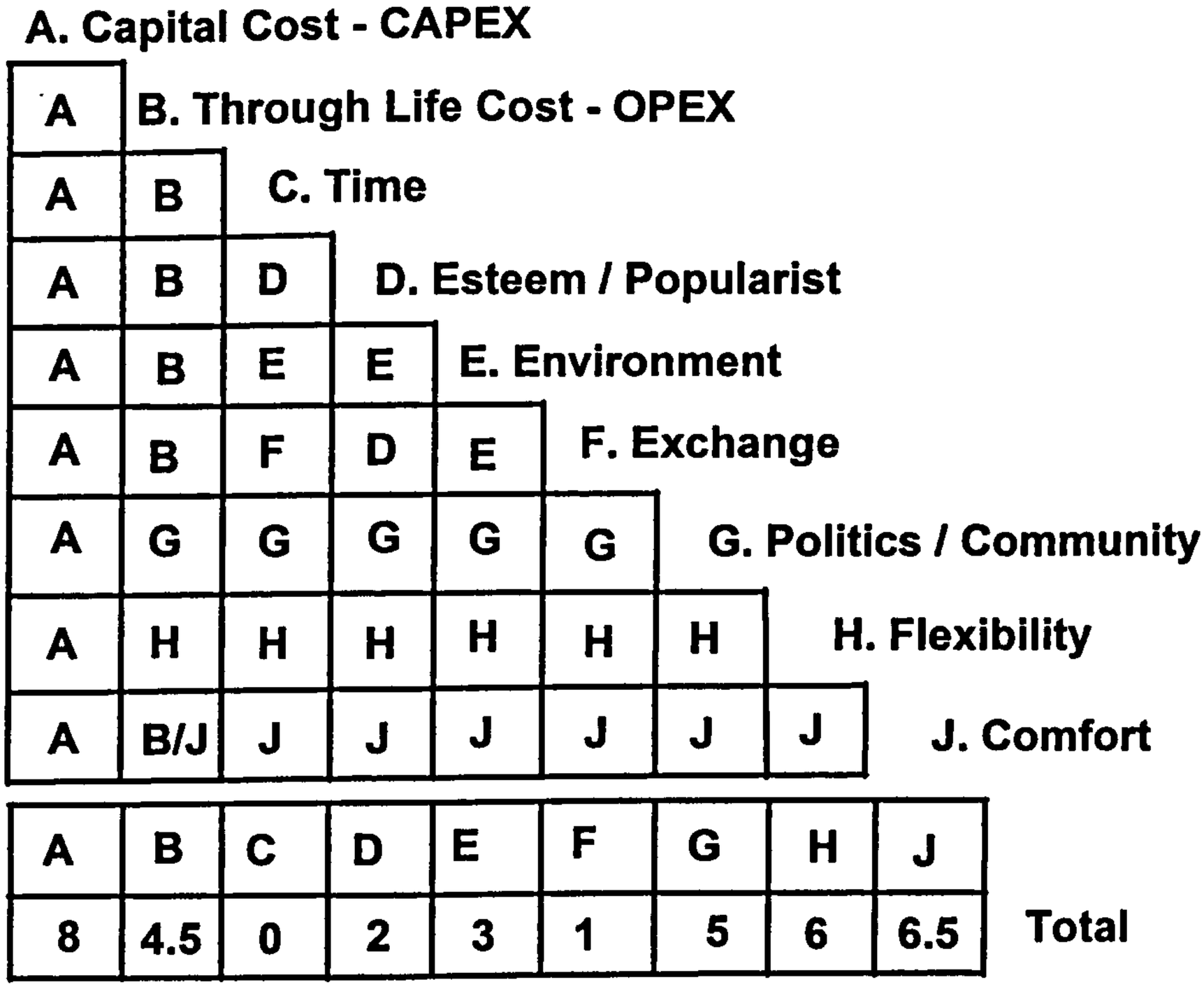


Figure 7.25 Client Value System for a Special Needs School

7.011 Summary

This chapter has described 11 action research experiments on 9 projects testing the research proposition that it is practical to develop a framework for the explicit exposition of the client value system, which includes all discretionary variables, for use in a value management workshop at the strategic briefing stage of construction projects. There is strong evidence to suggest that the finite number of discretionary variables is nine and comprises; capital cost (CAPEX), operating cost or through life cost (OPEX), time (for the current point in time until operability of the project or its absorption into core business), esteem, exchange, environment, politics and/or community, flexibility, comfort. The rules derived for the variables in chapters five and six remain robust.

The action research experiments have proved the iterative improvements in the client value system matrix. However, the rules of definition become of paramount importance when explaining to a client the mechanism of the matrix. In all instances this was well understood illustrated particularly by project 4 workshop 2 where the matrix was

explained by one client representative to another, and project 6 workshop 2 where the client representative was able to elucidate an argument for a redefinition of the variable CAPEX. The fact that project 9 was able to highlight a misunderstanding over the variable flexibility leads to some concern that the definition of the variables may not yet be absolutely fixed.

Chapter 8 Discussion, Conclusion and Recommendations for Further Work

8.01 Introduction

This research investigated the proposition that is practical to develop a framework for the explicit exposition of the client value system for use in a value management workshop at the strategic briefing stage of projects and that the value system should contain all discretionary variables for the definition of client values at this stage.

In the investigation of this proposition a client value system matrix is developed which comprises rules for its use, a definition of each of the variables and a method of ranking the importance of each variable through a paired comparison matrix. The model was tested in 11 action research value management workshops and found to be easily understood and very robust. A primary rule for the application of the model is that only the client, i.e. those with an intrinsic value interest in the project's instrumental value should develop the model.

The client value system matrix should be developed as a part of the strategic briefing process and reconfirmed at the technical briefing stage.

The evidence in this thesis supports the conclusion that the variables of the client value system are the nine high order discretionary performance variables of:

- CAPEX
- OPEX
- Time
- Esteem
- Exchange
- Environment
- Politics and/or community
- Flexibility
- Comfort.

There are no other discretionary performance variables which are not correlated with these. No such explicit definition of the client value system has been found in the

VM/VE or briefing literature, the debate until now of what represents client value being varied and superficial.

The client value system matrix presented here represents a unique contribution to value management and briefing practice.

8.02 Value management

Value engineering was founded in USA based upon a structure of function analysis, team work and the structured job plan. A number of techniques developed by practitioners aided a standardised application of value engineering which was formalised by the Society of American Value Engineers. These basic tenets of value engineering, evolved almost 60 years ago, are those in use today. Value engineering is seen to be an exercise on either a design or a product with the aim of providing the necessary functions at the lowest cost; an objective that fits well with the manufacturing business of high-volume production. The transfer of value engineering to construction presented an opportunity for the analysis of the strategy of the procuring client. In 1986 John Kelly and Steven Male, with the aid of an RICS Education Trust grant, studied the US practice of value engineering at that time. In their first publication (Kelly and Male: 1988) the recommendation was made that if the American system of value engineering was to be effective in a UK construction environment then it had to be applied earlier in the construction process than sketch design stage and the activity would be better entitled value management. After a period of etymological debate in the 1990's the terminology has settled down whereby value management is the term used to describe the whole process of the management of value and value engineering is that part which applies to the product and production of the product.

In 1996, with the aid of an Engineering and Physical Sciences Research Council grant, a collaborative research project involving University of Leeds and Heriot-Watt University, undertook an intensive study of value management internationally. The study involved benchmarking value management practice with 65 individuals from 58 international collaborating organisations and set the benchmark for value management as it was practised in 1996/7. The 1998 publication of the benchmarking documents (Male, et al: 1998a and 1998b) formed a convenient baseline on which to build further research. In summary value management was seen internationally as project focused,

team based, led by a knowledgeable VM practitioner or facilitator, involving the use of the job plan procedures, tools and techniques, having application at a number of points in the project development process, being function orientated and based upon an understanding of what is of value to the client.

Academic research in value management has considered the use of expert systems (Shen: 1993), a comparative analysis of quantity surveying and US value engineering (Palmer: 1992), the application of value management within client and construction organisations (Bell: 1994, Standing: 2001), the application of soft systems methodology (Liu and Leung: 2002), group decision support methods and the use of multi attribute rating scales (Green: 1996).

A feature of value management is its sole applicability to projects. It is not possible to use value management as a means of improving core business except through the institution of a project. If, for example, a business wishes to monitor its performance then it will do so either through total quality management or quality assurance. These techniques, based upon performance indicators, will alert the organisation to any failing within its core business operations. If the organisation then decides to raise a project to investigate or solve the problem, only then does value management become a possibility. Similarly, if an organisation wishes to invest to enhance its core business whether that be social or commercial then it will invariably invest in a project and again value management is relevant. Although the concept of the project is acknowledged implicitly by writers of value management texts and papers, what is meant by this term is rarely made explicit. This presents an area of potential research. Also while research has been undertaken on teams and team dynamics in social science, the topic of value management as a facilitated, temporary, formal team of unusually short duration is one that offers itself for further investigation.

However it was the early definition of value management (Kelly and Male: 1993) which provided the catalyst for this research. The early definition is "value management is a service which maximises the functional value of a project by managing its evolution and development from concept to completion, through the comparison and audit of all decisions against a value system determined by the client or customer". This definition has been widely cited and rarely challenged, although Green (1999) referring to this definition stated "it is seemingly taken for granted that the client value system can be

analysed in the same dispassionate way in which one would manipulate quadratic equations". At the time of the benchmarking study the most common method used in a workshop to elicit the client value system was the time, cost and quality triangle. This was often a contentious activity and although prompted useful debate never appeared to get to the crux of the client value criteria. From the perspective of this doctoral research the client value system provided the most interesting challenge.

8.03 Briefing

The research work of Kelly and Male in the early 1990s focused on the application of value management to the construction briefing stage. This led to two publications, (Kelly et al: 1992) and (Kelly et al: 1993). The first was a review and critique of briefing as it was then practised and the second a proposal for the application of value management to the strategic and project briefing stages. The updated review of briefing in this thesis concludes that the majority of briefing in the UK is an unstructured, investigative, continuous process, involving dialogue between the client representative and the brief taker (usually the architect or project manager). Briefing research discussed in this thesis has highlighted the dissatisfaction of clients with the current briefing process. Significant international work in the area of computer aided briefing has largely focused on the computerisation of current processes with most emphasis on database management and integration with computer aided design. In the USA, largely as a result of the American Institute of Architects (AIA) conditions of employment, the architect will receive a brief from the client. This has resulted in the service of architectural programming as a structured process carried out over a measured period of time with events occurring at particular points following investigative activity by the architectural programmer.

The conclusion to chapter 3 is that the weight of opinion in the UK, on whether the brief should be structured or unstructured is heavily on the side of structured and that these structures should be applicable to pluralistic clients to ensure accurate communication and recording. There is also weight of evidence to conclude that the majority of opinion concurs that logical progression through the process is seen to minimise change. Finally, the stages of strategic and project briefing recommended in the early Kelly and Male publication has been largely adopted and recommended as best practice. (CIB: 1997)

8.04 Synthesis and proposition formulation

A synthesis of the characteristics of value management and briefing was undertaken aided by a goal and systems modelling exercise. The goals of value management (figure 4.1) and briefing (figure 4.2) were extracted from the literature together with the systems in place for the satisfaction of those goals. For value management the technical systems were taken from the benchmarking study. The closest linkages with "client values" in the value management and briefing goal and systems model were determined as budget, established timeline, and space criteria. In the context of briefing other systems such as user analysis, activities and schedules may have been linked with client values. These links were not as sound in the same way as for example, state requirements is linked with room data sheets in the literature. In goal and systems modelling it is acknowledged that the links are interpretive rather than being determined scientifically.

An analysis of the value management and briefing literature led to the research proposition that it is practical to develop a framework for the explicit exposition of the client value system for use in a value management workshop at the strategic briefing stage of projects and that the value system should contain all discretionary variables for the definition of client values at this stage.

8.05 Research methodology

The research proposition led to an analysis of research and research methodology to determine the most appropriate research method for the development of a client value system matrix. A brief analysis of the research environment demonstrated that the proposed research is ontological and likely to use inductive and deductive methodologies. An important issue for this research was whether the researcher makes a choice of the research method or whether the problem itself demands a particular research approach. Following analysis it was concluded that the choice of the research method is always in the hands of the researcher and depends on whether the researcher wishes to be involved or detached, adopt a positivist or social constructivist approach and whether the researcher wishes to a maintain high control of the experimentation or is amenable to a more high risk strategy.

An investigation of existing theories of client value systems indicated that the terminology was in common use, principally in medical/counselling literature and also in some construction literature referring to the employer. There is no theory directly attributable to the client value system although there is theoretical description of the concept of value. No published case study of a value equation in use was found in the VM/VE literature.

An analysis of research methods determined that there were six possible courses of relevant research action but that in the context of the client value system research only action research was conducive to research with facts, as opposed to opinion.

The research adopted the principles of Wacker (1998) for theory building and formulation. This has led to the proposition of frameworks at five levels. At level 0 are the fundamental laws, level 1 contains the conceptual framework, level 2 the theoretical framework, level 3 the technical framework and level 4 the practical framework. This is summarised in figure 4.7 the research diagram. Combined with action research, inductive research led to the formulation of a theory at the theoretical level. Deductive action research resulted in the formulation of a technical expression of the theory at level 3 and testing of the theory at level 4. Analysis of the results led to new theory in a process termed the theory bounce. The final theory is lodged at the theoretical level with the technical and practical expression illustrated in figure 8.1 and described below. During this process deductive research was carried out by bringing existing theories of value into a theoretical expression for the client value system. An analysis of principally two references highlighted a number of perspectives on value namely practical value, moral value, intellectual value, aesthetic value and instrumental value. These value perspectives exist within a framework of intrinsic and extrinsic values.

Seven potential methods were considered for the expression of the client value system as a model, with the simple paired comparison being chosen. At this stage in the research an opportunity presented itself for the testing of model 1 which theoretically was perhaps not as robust as it should have been but the opportunity was taken none the less. Significant difficulties in the proposed model were identified which led to further inductive and deductive research described in chapter 6. The development of the client value system matrix through three interrelated pieces of work, an analysis of quality and

value, an understanding of the basic and performance variables of the client value system and an understanding of individual and corporate values led to new theory in the expression of model 2.

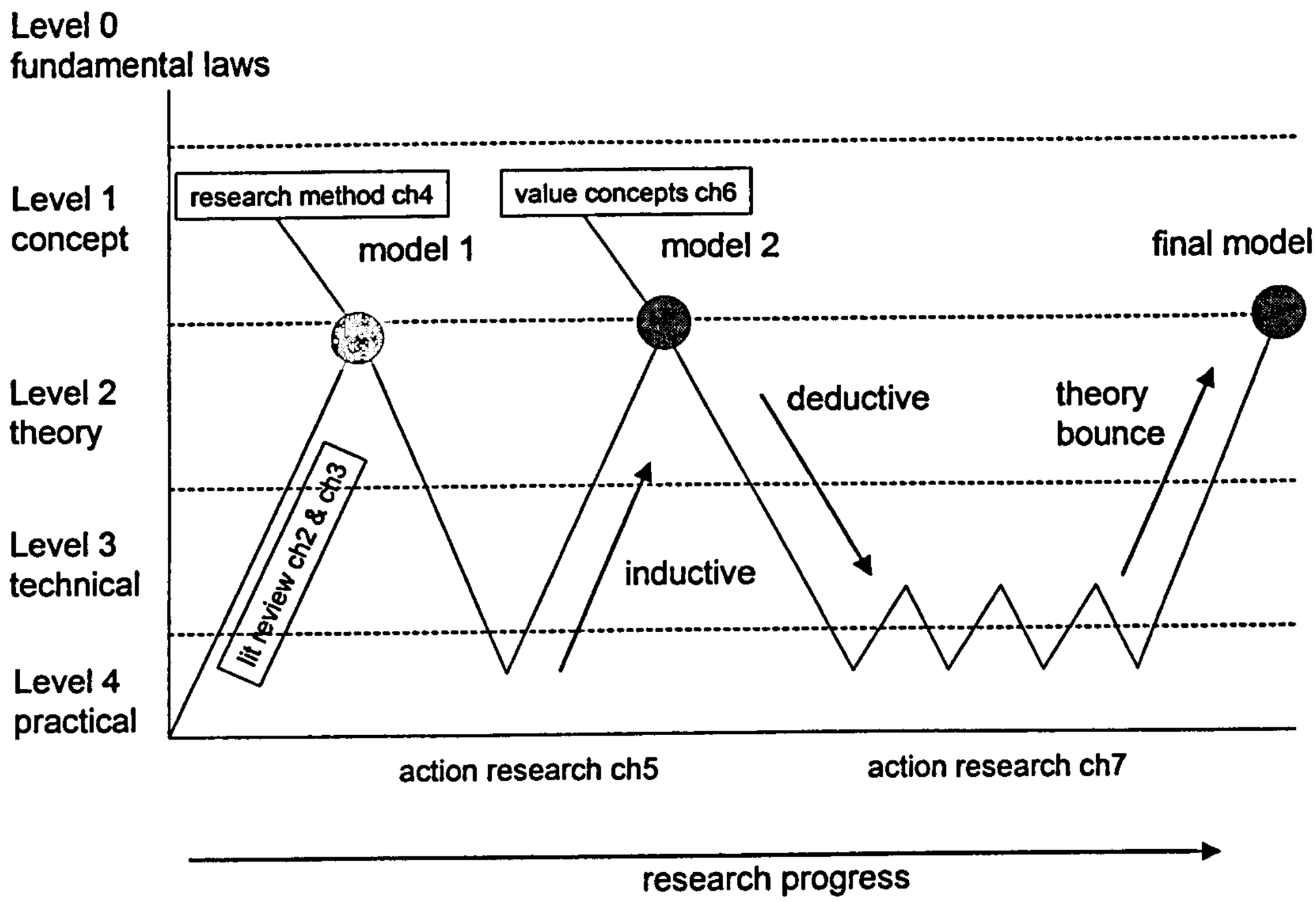


Figure 8.1 summary of research

The work in chapter 6 led to a robust model which was tested in 11 action research experiments on 9 projects. Whereas the results of the action research experiment in Chapter 5 led to radical rethinking of the model the action research experiments described in Chapter 7 led only to refinement and definition of the variables. One missing variable was added, that of Flexibility.

8.06 The final model and proposed new theory

It is proposed that it is practical to develop a framework for the explicit exposition of the client value system, which includes all discretionary variables, for use in a value management workshop at the strategic briefing stage of construction projects. It is contended that the finite number of discretionary variables is nine and comprises; capital cost (CAPEX), operating cost or through life cost (OPEX), time (from the current point in time until operability of the project or its absorption into core business),

esteem, exchange, environment, politics and/or community, flexibility, comfort. The description of each variable is:

Capital cost (CAPEX) are all costs associated with the capital costs of the project, measured on a continuum between the budget not being exceeded, to there is complete flexibility in budgeting. Capital costs are all costs incurred from inception of the project until operability, occupation or service delivery as a part of core business. In some situations the capital investment is subsumed within the operating cost and therefore the capital cost variable is omitted. This can occur for example where the cost of a building is rentalised within a total lease package, such as within a Private Finance Initiative project. In mainly public sector projects where there is an absolute budget, flexibility in capital cost may be considered in terms of sacrifice of space. The question is not "Is the client willing to spend more now to reduce future OPEX?" but "Is the client willing to sacrifice space to reduce future OPEX?"

Operating cost (OPEX) refers to all costs associated with the operations and maintenance of the completed project as it moves to an operational product within the client's core business. In the context of a building this includes facilities management which may be limited to maintenance, repairs, utilities, cleaning, insurance, caretaker and security, but may be expanded to include the full operational backup such as catering, IT provision, photocopying, mail handling and other office services. The continuum is between OPEX must be at a controlled absolute minimum, to there is flexibility in operating cost.

Time is the time from the present until the project is absorbed back into the client's core business. Time is assessed on a continuum between "time is of the essence" i.e. "one day late and the project is worthless", to "time is at large" i.e. the project only has to be completed within a reasonable time.

Politics is an external dimension that refers to the extent to which community, popularity and good neighbour issues are important to the client. The continuum ranges from must be popular with the local community or electorate, to we have no concerns towards our neighbours.

Environment refers to the extent to which the project results in a sympathetic approach to the environment, measured by its local and global impact, its embodied energy, the energy consumed through use, and other "green" issues. The continuum is between maximum observance of Kyoto and Agenda 21 issues, to indiscriminate sourcing policies and solving every problem by adding more power.

Exchange or resale is the monetary value of the project. This may be viewed as; assets on the balance sheet, the increase in share value, capitalised rental or service income, or how much the project would realise were it to be sold. The continuum is between maximum return and return is of no consequence. If the physical asset is never to be sold then this item would be scored as zero in the value system matrix.

Flexibility represents the extent to which project parameters have to reflect a continually changing environment in the design. This value criterion is generally associated with changing technology or organisational processes or both. For example, medical practice is changing so rapidly that spaces in a hospital may need to accommodate a number of differing functions during the life of the building. The flexibility may be considered in terms of the re-use of space as designed (alteration) or in terms of the total reconfiguration of the spaces (demolition and alteration). The continuum is between highly flexible to accommodate changing functions to unlikely, to change to any extent. If the project does not have to accommodate any flexibility then this variable is scored as zero.

Esteem is the extent to which the client wishes to commit resources for an aesthetic statement or portray the esteem of the organisation, internally and externally. The continuum is between we need to attract the admiration of the world, to esteem is of no significance.

Comfort is the physical and psychological comfort of the building as a place for working and living. Comfort is measured on a continuum from the support of the business in purely utilitarian terms, to the highest degree of opulence.

The final matrix model is as shown in diagram 8.2.

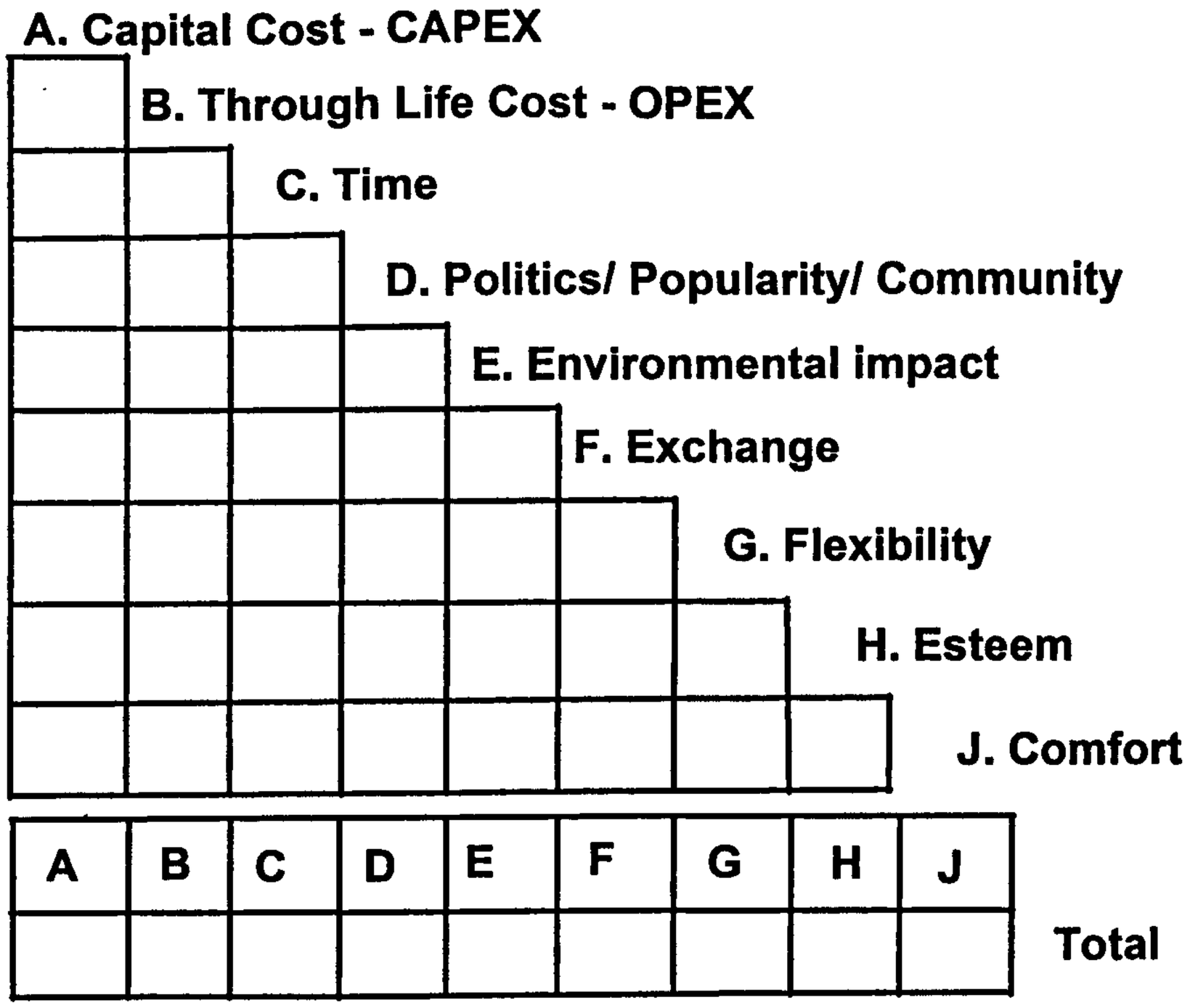


Figure 8.2 Final Client Value System Matrix

8.07 Critique

This work is not finished. A number of research strands not directly relevant to the research proposition have been set to one side. In this final section of the thesis the strands are explained and suggestions as to how they may be addressed described.

The goal and systems model

The goal and systems model was useful in highlighting client values as a feature of both briefing and value management literature. The goal and systems modelling was carried out by taking an overview of the literature and determining those identified goals and also the descriptions of the tools and techniques which appeared to be associated with those goals. However, the system as used could be considered superficial in the presence of such tools such as content analysis. This element of the research would have been strengthened by a more thorough analysis of the literature notwithstanding the fact that even a superficial overview was sufficient to confirm that a significant number of authors make reference to a set of client values.

Personal and organisational values

During the research the issue of personal and corporate value led to concern that an individual's culture and beliefs would determine their value system as a customer and also as a member of the construction client team and that these issues would need intensive investigation. There was however, sufficient work in the field of customer values reviewed in chapter 6 to conclude that an individual's personal beliefs are different to their behaviour as a customer. This avenue of research appears relatively unexplored in the context of the construction client. The work in this thesis concludes that the evolved project brief will exist with or without a clear description of the value system of the client. The brief will be handed to a design and construction team who will develop, using their own professional and technical expertise, a solution to the project. The project will thereby be given form and effectively value. In the absence of a client value system the design and construction team will be influenced by their interpretation of the client's corporate values. The design and construction team will also be influenced by extrinsic values such as those relating to esteem and environmental issues. The project will attract these values whether or not an explicit client value system has informed them. This is an important issue to the corporate organisation procuring a building and begs the question "who do we trust to impart our value system to the project team?" There is a large research project here.

Pluralistic clients

The action research workshops used the client representatives present to complete the client value system matrix. In some case studies there were overt or covert differences between the client groups present. This invites a study on who should determine the corporate value system and how could this be achieved within a workshop environment.

Stakeholder values

Reacting to the difficulties in the second action research case study described in chapter 5, considerable investigation was carried out into intrinsic and extrinsic values. It was determined that the construction client's interest in the project was intrinsic and the project itself conferred instrumental value to the client's business. For example, if the

client was a bottled water producer who wished to increase production then what is of intrinsic value to the client is more bottled water through the process. A new production plant would confer instrumental value. The design and construction team's value interest is extrinsic since they leave the site once the new production plant is ready for production. In a similar manner the planning officer's value interest is also extrinsic. This leads to a tentative conclusion illustrated in figure 8.3 that those with intrinsic value interest will have control of the majority of the value variables but those with extrinsic value interest might claim to have an interest in some.

	Intrinsic	Extrinsic	Practical	Moral	Intellectual	Aesthetic
CAPEX	●		●			
OPEX	●		●			
Time	●		●			
Exchange	●		●			
Esteem	●	●		●	●	●
Environment	●	●	●	●	●	
Politics	●	●	●	●	●	●
Flexibility	●		●			
Comfort	●		●	●	●	●

Figure 8.3 value interests of those with intrinsic and extrinsic value

This issue was only explored sufficient to justify the exclusion of the design and construction team from the client value system exercise in a value management workshop. However, this topic requires further research work.

Partnering workshops

Following on from the above debate one of the action research workshops involved the derivation of a partnering agreement. This was run as a traditional value management workshop with only the client contributing to the client value system. Upon further consideration however, all parties at the workshop had an intrinsic value in the partnering agreement. This is a topic for further research.

Sensemaking

Thiry (2000) raises the issue that as the pressure for shorter and more focused value management studies intensifies and the complexity of projects subject to value management increases then consideration has to be given to the communication and data structures which exist within the workshop. This is a useful comment in the context of the client value system. The question is whether given more time to think through the value system, rather than an "on the spot" performance, would the answer be different. This begins to raise a possible consideration for a pre-workshop questionnaire which would allow time for thought. This also leads to the consideration of questions which deduce the answer to the matrix through some form of weighting and scoring system. Whichever way this research goes there are some significant questions under this heading.

Logic and mathematical logic

During the action research workshops, apparent logic errors were perceived during the completion of the client value system matrix. These were not noticed by the team and were not drawn to their attention as the apparent errors were few in number and would not have impacted the result. During the research the detailed study of the logic and the mathematical expression of that logic became a very attractive distraction. The logic errors were if A is more important than B and B is more important than C then can C be more important than A. The reason for not drawing this to the attention of the team although it was noticed at the time was the uncertainty of the result. It is logical to say A is taller than B and B is taller than C then A is certainly taller than C but this relies on a simple interval scale. The client value system is not an interval scale; the ranking was only ever used to state a general conclusion. Further research is needed to explore the mathematical logic.

8.08 Summary of recommendations for further research

The areas for further research highlighted during the research into client value systems are:

1. Goal and systems modelling using content analysis. This research used a superficial overview of the literature to distil the goals and systems embedded in the literature. As a research method this could be improved by using content analysis although the exact form and coding methodologies require further research work.
2. The research undertaken into personal and organisational value went only as far as was necessary to be assured that an individual's culture and beliefs would not impact their value system as a customer or client. There is further research to be undertaken to determine who within the client organisation is best entrusted to impart the value system of the client.
3. This research highlighted the differences of opinion within various groups of the client organisation e.g. medical consultants, nursing staff, operations management and facilities management within a healthcare organisation. Research is required into how best to reach consensus on the values of the groups within an organisation.
4. This research reached a position where only the client representatives at a value management workshop should undertake the completion of the client value system matrix. This ignores the position of those stakeholders with extrinsic value interest in the construction project. Further research is required to determine the method of their involvement.
5. Similar to 4 above in a partnering workshop the design and cost consultants and the contractor have an intrinsic interest in the partnering agreement. Further research is required on the method of their involvement.
6. The research described required an "on the spot" performance from the client representatives. Whilst this presented no problems it did not give any time for re-consideration. The issue of sensemaking requires further research.
7. There is a large research opportunity to examine the area of logic and particularly mathematical logic of the client value system matrix evolved through the research reported in this thesis.
8. Having discovered the discretionary variables for a client value system it is possible to determine the basic and performance criteria by which to select contractors and consultants where this is required on a best value basis. This work has been addressed by Jackson-Robbins (1998) but the illustrative criterion used to populate the selection model is random. It is suggested that further research based upon the client value system matrix in this thesis would be of help to those public sector organisations who wish to design a tender system on a best value basis.

9. A final observation under this section is the fact that no commissions for value management studies were received from architect's practices. The reason for this is not known.

8.09 Final comments

This doctoral research set out to investigate the research proposition that it is practical to develop a framework for the explicit exposition of the client value system for use in a value management workshop at the strategic briefing stage of projects and that the value system should contain all discretionary variables for the definition of client values at this stage.

This has been accomplished. The evidence in this thesis supports the conclusion that the variables of the client value system are nine high order variables of:

- CAPEX
- OPEX
- Time
- Esteem
- Exchange
- Environment
- Politics and/or community
- Flexibility
- Comfort.

There are no other discretionary performance variables which are not correlated with these.

8.010 References

Bell, K L 1994, *The strategic management of projects to enhance value for money for BAA plc* PhD thesis Heriot-Watt University September 1994 pages 284 – 288.

Construction Industry Board, 1997, *Briefing the team: working group 1*, Thomas Telford, London.

Green, SD 1996, *SMART value management: a group decision support methodology for building design* Unpublished PhD Thesis, University of Reading.

Green, SD 1999, A participative research strategy for propagating soft methodologies in value management practice, *Construction Management and Economics* **17**, 329 - 340.

Jackson-Robbins, A 1998, *Selecting contractors by value (SP150)*, CIRIA, London.

Kelly, JR and Male, SP 1988 *A study of value management and quantity surveying practice,* Occassional paper, Surveyors Publications, London.

Kelly, J, Macpherson, S and Male, S 1992 *The briefing process: a review and critique*, Royal Institution of Chartered Surveyors, London.

Kelly, J and Male, S 1993 *Value management in design and construction:the economic management of projects,* Spon.

Kelly, J, Male, S and Macpherson, S 1993, Value management: a proposed practice manual for the briefing process, Royal Institution of Chartered Surveyors, London.

Male S, Kelly J, Fernie S, Grönqvist M, and Bowles G (1998a) *The value management benchmark: a good practice framework for clients and practitioners*, Thomas Telford, London.

Male S, Kelly J, Fernie S, Grönqvist M, and Bowles G (1998b) *The value management benchmark: research results of an international benchmarking study*, Thomas Telford, London.

Lui, AMM and Leung, M 2001, Developing a soft value management model *International Journal of Project Management* vol**20** 341-349

Palmer, AC 1992, *An investigative analysis of value engineering in the United States construction industry and its relationship to British cost control procedures,* unpublished PhD thesis Loughborough University of Technology.

Shen, QP 1993, *A knowledge-based structure for implementing value management in the design of office buildings*, unpublished PhD thesis University of Salford.

Standing, N 2001, *Value engineering and the contractor,* unpublished PhD thesis University of Leeds

Thiry, M 2000, Sensemaking in value management practice International Journal of Project Management vol **19** p71-77

Wacker, J G 1998, A definition of theory: research guidelines for different theory building research methods in operations management, *Journal of Operations Management* vol**16** p361-385.